Session 1: Introduction to DBMS

What does DBMS stand for?
a) Data Base Management System ✅
b) Data Batch Management System
c) Database Machine Structure
d) Data Building Memory Software

Which of the following is not a function of DBMS?
a) Data storage management
b) Data manipulation
c) Data backup
d) Virus scanning ✅

The main goal of a DBMS is:
a) Data processing
b) Reduce redundancy ✅
c) Increase complexity
d) Formatting

DBMS allows users to:
a) Delete data
b) Insert data
c) Update data
d) All of the above ✅

The component responsible for data storage management is:
a) DDL compiler
b) File manager ✅
c) Query processor
d) DML compiler

Which level of data abstraction describes what data is stored in the database?
a) View level
b) Logical level ✅
c) Physical level
d) External level

Which is not a component of DBMS?
a) Query processor
b) DDL interpreter
c) Compiler ✅
d) File manager

Which one of the following is a type of DBMS?
a) Hierarchical
b) Network
c) Relational
d) All of the above ✅

The language used to define the structure of a database is:
a) DML
b) DDL ✅
c) DCL
d) SQL

Which operation is not supported by relational algebra?
a) Selection
b) Insertion ✅
c) Projection
d) Union

The DBMS acts as an interface between:
a) Data and file
b) Application and database ✅
c) Software and hardware
d) None of the above

The term "data redundancy" refers to:
a) Multiple data entries ✅
b) Loss of data
c) Organized data
d) None

Which of the following is a property of a good DBMS?
a) High redundancy
b) Low scalability
c) Data consistency ✅
d) No backup

The relational model was introduced by:
a) Charles Bachman
b) Edgar F. Codd ✅
c) IBM
d) Oracle

Data integrity in DBMS refers to:
a) Security
b) Consistency and accuracy ✅
c) Sharing
d) Modeling

The data dictionary stores:
a) The actual data
b) Metadata ✅
c) Temporary files
d) External views

Which of the following is a DML command?

a) SELECT ✅
b) CREATE
c) DROP
d) GRANT

Data independence is:

a) Application changes when data changes
b) Application does not change when data storage changes ✅
c) Application and data tightly coupled
d) None

Logical data independence is the ability to:

a) Modify physical schema
b) Modify logical schema without affecting applications ✅
c) Modify external schema
d) None

The ______ schema defines the physical storage structure.

a) Conceptual
b) Internal ✅
c) External
d) Logical

Which of the following ensures data consistency?

a) DDL
b) ACID properties ✅
c) DML
d) DBA

Which of the following is not a valid key in DBMS?

a) Primary key
b) Foreign key
c) Alternate key
d) Complex key ✅

What does ACID stand for?

a) Atomicity, Consistency, Isolation, Durability ✅
b) Access, Control, Indexing, Durability
c) Authentication, Control, Identification, Data

Which language is used for accessing data in DBMS?

a) DML ✅
b) DDL
c) DCL
d) TCL

What is a database instance?

a) Entire database

b) Snapshot of data at a particular moment ✅
c) A key
d) None

Data abstraction in DBMS helps to:
a) Hide irrelevant details ✅
b) Increase redundancy
c) Improve performance
d) Enforce security

A database is:
a) Collection of files
b) Collection of interrelated data ✅
c) Set of programs
d) Collection of tables only

Which of the following is true about DBMS?
a) DBMS can handle complex queries ✅
b) DBMS cannot enforce constraints
c) DBMS always stores data on tape
d) DBMS is not scalable

The process of designing database structure is known as:
a) Normalization
b) Modeling ✅
c) Compilation
d) Optimization

Database security refers to:
a) Backing up data
b) Protecting data from unauthorized access ✅
c) Encrypting data only
d) None

In a DBMS, views are used for:
a) Data modification
b) Providing security ✅
c) Storing physical data
d) Designing schemas

Which component handles query execution?
a) Query processor ✅
b) Compiler
c) DDL compiler
d) DCL processor

The external schema is also called:
a) Logical view
b) User view ✅

c) Internal view
d) Conceptual view

Which is a disadvantage of file processing system over DBMS?
a) More redundancy ✅
b) More security
c) Easy to access
d) Data consistency

Which tool is used to manage DBMS?
a) Operating System
b) DBMS software ✅
c) Antivirus
d) Compiler

A relation is a:
a) Table ✅
b) File
c) Record
d) View

Which key is used to uniquely identify rows?
a) Foreign key
b) Composite key
c) Primary key ✅
d) Candidate key

Which term refers to correctness of data?
a) Data security
b) Data integrity ✅
c) Data independence
d) Data model

A foreign key:
a) Uniquely identifies tuples
b) References primary key in another table ✅
c) Cannot be null
d) Must be unique

Which of the following is not a DBMS?
a) Oracle
b) MySQL
c) PostgreSQL
d) HTML ✅

Which of the following is not a data model?
a) Hierarchical
b) Network

c) Tabular ✅
d) Relational

Which model uses parent-child relationships?
a) Relational
b) Network
c) Hierarchical ✅
d) Object

Entity-relationship model is:
a) High-level data model ✅
b) Low-level model
c) Physical model
d) None

What is schema?
a) Snapshot of database
b) Overall logical structure of database ✅
c) Set of tables
d) None

Who is responsible for authorizing access to database?
a) Developer
b) DBA ✅
c) Designer
d) User

Which one is true for DBMS?
a) Always stored on cloud
b) Designed for concurrent access ✅
c) Cannot handle backup
d) Cannot handle transactions

Redundancy leads to:
a) Faster processing
b) Inconsistency ✅
c) Consistency
d) Better security

Tuple in DBMS refers to:
a) Column
b) Table
c) Row ✅
d) File

Attribute in DBMS is:
a) Row
b) Column ✅

c) Table
d) Relationship

DCL stands for:
a) Data Control Language ✅
b) Data Column Language
c) Database Constraint Level
d) Data Column Logic

Topic: Areas where DBMS are Used

1. Which of the following sectors commonly uses DBMS technology?
   a) Banking
   b) Airlines
   c) Education
   d) All of the above ✅

2. In banking, DBMS is primarily used for:
   a) Drawing cheques
   b) Storing customer data and transactions ✅
   c) Counting currency
   d) Running advertisements

3. A library information system uses DBMS to manage:
   a) Books inventory
   b) Member records
   c) Book issuing/returning
   d) All of the above ✅

4. Which component of a hospital system would benefit most from DBMS?
   a) Cafeteria
   b) Patient records ✅
   c) Parking management
   d) Hospital construction

5. DBMS is useful in airlines for:
   a) Engine maintenance
   b) Ticket reservations and flight schedules ✅
   c) Baggage handling
   d) Aircraft painting

6. Which of the following is **not** a real-world application of DBMS?
   a) Word processing ✅
   b) E-commerce
   c) Payroll systems
   d) Railway reservations

7. In e-commerce, DBMS is used to manage:
   a) Product catalogs

b) Customer orders
c) Payment records
d) All of the above ✅

8. Which industry uses DBMS for managing supply chain and inventory?
a) Manufacturing ✅
b) Education
c) Transportation
d) Agriculture

9. CRM systems rely on DBMS to:
a) Track customer interactions ✅
b) Develop advertisements
c) Perform marketing interviews
d) Manage suppliers

10. A university database typically stores information about:
a) Students
b) Faculty
c) Courses
d) All of the above ✅

11. Railway reservation systems use DBMS for:
a) Announcements
b) Cleaning schedules
c) Ticket bookings and seat availability ✅
d) Refreshments

12. In telecom, DBMS helps in:
a) Laying cables
b) Storing call records ✅
c) Installing SIMs
d) Selling phones

13. Retail chains use DBMS for:
a) Customer management
b) Billing systems
c) Product inventory
d) All of the above ✅

14. Which function of DBMS is crucial in online exam systems?
a) Security and result generation ✅
b) Drawing question papers
c) Printing certificates
d) Verifying attendance

15. Police departments use DBMS to store:
a) Criminal records ✅
b) Road maps

c) Parking slots
d) Traffic signs

16. What type of database is commonly used in mobile apps?
a) Cloud database ✅
b) Paper-based log
c) Excel sheets
d) USB drive

17. Banking systems use which kind of database mostly?
a) Hierarchical
b) Relational ✅
c) Graph
d) Network

18. Which organization needs DBMS for managing passport records?
a) Ministry of External Affairs ✅
b) Indian Railways
c) Election Commission
d) BSNL

19. Social media platforms use DBMS to:
a) Create memes
b) Store user profiles and messages ✅
c) Generate content
d) Design logos

20. What kind of database is typically used in scientific research?
a) Multimedia DB
b) Object-oriented DB ✅
c) Hierarchical DB
d) OLAP

Topic: Introduction to RDBMS

1. What does RDBMS stand for?
a) Relational DataBase Management System ✅
b) Real-time Database Management System
c) Remote Database Management System
d) Rational Database Management Server

2. RDBMS is based on which model?
a) Object-oriented
b) Relational model ✅
c) Network model
d) Hierarchical model

3. Who introduced the relational model?
   a) Charles Babbage
   b) Edgar F. Codd ✅
   c) Bill Gates
   d) Charles Bachman

4. A table in RDBMS is also called a:
   a) Tuple
   b) Attribute
   c) Relation ✅
   d) File

5. A row in a table is called a:
   a) Field
   b) Tuple ✅
   c) Attribute
   d) Relation

6. A column in a table is called an:
   a) Record
   b) Attribute ✅
   c) Entity
   d) Tuple

7. Which of the following uniquely identifies a row in a table?
   a) Foreign key
   b) Primary key ✅
   c) Composite key
   d) Super key

8. Which of the following can act as a primary key?
   a) Name
   b) Email (if unique) ✅
   c) Address
   d) Age

9. The relationship between tables is established using:
   a) Primary key
   b) Candidate key
   c) Foreign key ✅
   d) Unique key

10. Which of the following is **not** a property of RDBMS?
   a) Data is stored in tables
   b) Supports indexing
   c) Uses tree structure ✅
   d) Supports SQL

11. What is a foreign key?
    a) Unique identifier in its own table
    b) Field that refers to primary key of another table ✅
    c) Redundant field
    d) None

12. What does SQL stand for?
    a) Standard Query Language
    b) Structured Query Language ✅
    c) Sequential Query Language
    d) None

13. Which SQL clause is used to filter records?
    a) ORDER BY
    b) GROUP BY
    c) WHERE ✅
    d) HAVING

14. Which SQL command is used to retrieve data?
    a) GET
    b) SELECT ✅
    c) RETRIEVE
    d) ACCESS

15. Which command is used to remove all rows from a table?
    a) DELETE
    b) DROP
    c) TRUNCATE ✅
    d) CLEAR

16. Which command is used to remove the structure of a table?
    a) DELETE
    b) DROP ✅
    c) TRUNCATE
    d) REMOVE

17. Which SQL statement is used to create a new table?
    a) ADD TABLE
    b) NEW TABLE
    c) CREATE TABLE ✅
    d) MAKE TABLE

18. Which clause is used to sort the result set?
    a) SORT
    b) ORDER BY ✅
    c) GROUP BY
    d) FILTER

19. Which of the following is a DML statement?
a) CREATE
b) SELECT ✅
c) DROP
d) ALTER

20. Which is a DDL command?
a) SELECT
b) INSERT
c) UPDATE
d) CREATE ✅

21. Which one is **not** a valid constraint in RDBMS?
a) NOT NULL
b) UNIQUE
c) INTEGER ✅
d) CHECK

22. What does the NOT NULL constraint do?
a) Allows duplicate values
b) Prevents null values ✅
c) Enforces relationships
d) Allows indexing

23. The UNIQUE constraint ensures:
a) Values must be numeric
b) All values are different ✅
c) All values are the same
d) All values are NULL

24. A composite key is:
a) A single primary key
b) A combination of fields to uniquely identify a row ✅
c) A duplicate key
d) None

25. Which of the following is a valid RDBMS?
a) Oracle
b) MySQL
c) SQL Server
d) All of the above ✅

26. Which clause groups rows with same values?
a) WHERE
b) ORDER BY
c) GROUP BY ✅
d) HAVING

27. Which clause is used with GROUP BY to filter grouped data?
    a) WHERE
    b) ORDER BY
    c) HAVING ✅
    d) SELECT

28. Referential integrity ensures:
    a) Correct data types
    b) Valid references between tables ✅
    c) No nulls
    d) Query speed

29. Which join returns only matching rows from both tables?
    a) INNER JOIN ✅
    b) LEFT JOIN
    c) RIGHT JOIN
    d) FULL JOIN

30. Which join returns all rows from the left table and matching rows from right?
    a) INNER
    b) LEFT JOIN ✅
    c) RIGHT JOIN
    d) SELF JOIN

31. What does the term "normalization" refer to in RDBMS?
    a) Data filtering
    b) Organizing data to reduce redundancy ✅
    c) Sorting
    d) Indexing

32. RDBMS helps in:
    a) Managing data relationships ✅
    b) Installing OS
    c) System design
    d) None

33. Which operation is used to rename a relation in relational algebra?
    a) SELECT
    b) PROJECT
    c) RENAME ✅
    d) UNION

34. Which SQL keyword is used to update existing data?
    a) CHANGE
    b) MODIFY
    c) UPDATE ✅
    d) EDIT

35. Which of the following returns the total number of rows?
    a) COUNT(*) ✅
    b) SUM()
    c) LENGTH()
    d) TOTAL()

36. What does the DISTINCT keyword do?
    a) Removes NULL values
    b) Removes duplicate records ✅
    c) Replaces values
    d) Filters text fields

37. A relation in RDBMS should not have:
    a) Duplicate tuples ✅
    b) Attributes
    c) Foreign keys
    d) NULL values

38. Which is **not** an advantage of RDBMS?
    a) Data consistency
    b) Data redundancy ✅
    c) Data sharing
    d) Integrity constraints

39. Which component of RDBMS interprets and processes SQL?
    a) Index manager
    b) Query processor ✅
    c) Lock manager
    d) File manager

40. Which of these is an aggregate function in SQL?
    a) LENGTH()
    b) SUM() ✅
    c) CONCAT()
    d) UPPER()

41. Which function is used to find max value?
    a) HIGHEST()
    b) MAX() ✅
    c) LARGEST()
    d) GREATEST()

42. What is the default sorting order in SQL?
    a) Descending
    b) Random
    c) Ascending ✅
    d) No order

43. Which clause limits the number of rows returned?
   a) FIRST
   b) TOP
   c) LIMIT ✅
   d) MAX

44. What is a candidate key?
   a) A primary key selected randomly
   b) Any key that can be a primary key ✅
   c) Duplicate key
   d) Composite key

45. Which of the following is **not** a relational operation?
   a) Selection
   b) Projection
   c) Normalization ✅
   d) Join

46. What is the result of Cartesian Product?
   a) Subset of both tables
   b) Set of matching tuples
   c) All possible combinations of rows ✅
   d) Filtered tuples

47. Which command removes a record from table permanently?
   a) REMOVE
   b) DELETE ✅
   c) CLEAR
   d) ERASE

48. Which one is used for transaction control in SQL?
   a) COMMIT ✅
   b) SELECT
   c) INSERT
   d) CREATE

49. A DBMS that supports the relational model is called:
   a) Flat DBMS
   b) OODBMS
   c) RDBMS ✅
   d) HDBMS

50. Which of the following ensures atomicity in transactions?
   a) Primary key
   b) ACID ✅
   c) DML
   d) DDL

Topic: Codd’s 12 Rules for a Relational Database

1. Who proposed the 12 rules of a relational database system?
   a) Charles Bachman
   b) Edgar F. Codd ✅
   c) Donald Chamberlin
   d) James Gosling

2. What is the primary purpose of Codd’s 12 rules?
   a) Improve programming logic
   b) Define what a true RDBMS should support ✅
   c) Create hierarchical databases
   d) Enhance file systems

3. Rule 1 (Information Rule) states:
   a) All information must be stored in XML
   b) All data must be stored in tables ✅
   c) All data must be encrypted
   d) Data should be accessible only via applications

4. In Rule 2 (Guaranteed Access Rule), access to data must be possible via:
   a) APIs
   b) Command-line tools
   c) Primary key
   d) Table name, column name, and primary key ✅

5. Rule 3 refers to:
   a) Systematic treatment of null values ✅
   b) Ensuring data redundancy
   c) Primary key enforcement
   d) Use of indexing

6. Nulls in a relational database should represent:
   a) Missing value
   b) Inapplicable value
   c) Both ✅
   d) None

7. Rule 4 (Dynamic Online Catalog):
   a) Catalog must be accessible to DBA only
   b) Catalog must be stored as base tables ✅
   c) Catalog must be offline
   d) Catalog should not be accessible

8. What is Rule 5 about?
   a) Powerful query language ✅
   b) Authentication
   c) Table joins
   d) Data mining

9. The query language mentioned in Rule 5 must support:
   a) Definition, manipulation, and constraints ✅
   b) Encryption
   c) UI features
   d) Scheduling

10. Rule 6 focuses on:
    a) Data independence ✅
    b) Indexing
    c) Views
    d) Trigger handling

11. What is physical data independence?
    a) Changing hardware
    b) Changing physical storage without affecting applications ✅
    c) Changing user interface
    d) Changing SQL queries

12. Logical data independence allows changes in:
    a) Internal schema
    b) Physical schema
    c) Logical schema without affecting applications ✅
    d) External schema

13. Rule 7 is about:
    a) Integrity independence ✅
    b) Backup
    c) Scalability
    d) Speed

14. Integrity constraints should be:
    a) Enforced by front-end
    b) Stored and managed within DBMS ✅
    c) Managed manually
    d) Ignored

15. What does Rule 8 (View Updating Rule) state?
    a) Views should never be updated
    b) Views should be updatable as base tables ✅
    c) Views must be read-only
    d) Views must be encrypted

16. Rule 9 is about:
    a) Logical consistency
    b) High-level insert, update, and delete ✅
    c) Multi-table support
    d) Primary key generation

17. Rule 10 focuses on:
    a) Distribution
    b) Logical data storage
    c) Logical data independence
    d) Physical data independence ✅

18. Rule 11 is known as:
    a) Comprehensive data sublanguage rule ✅
    b) Referential integrity rule
    c) Tuple consistency rule
    d) Relational enforcement rule

19. Rule 12 is about:
    a) Security control
    b) Non-subversion rule ✅
    c) Query optimization
    d) Storage engines

20. The Non-subversion Rule ensures:
    a) No hacking is possible
    b) Low-level access cannot bypass integrity rules ✅
    c) Indexes are hidden
    d) Constraints are ignored in backup

21. Rule 0 is:
    a) Unofficial rule
    b) Foundation rule ✅
    c) Never used
    d) Deprecated

22. Rule 0 says:
    a) System must support SQL
    b) System must be open-source
    c) System must qualify as relational if it supports all 12 rules ✅
    d) System must have GUI

23. How many rules must a system follow to be a "true" RDBMS, according to Codd?
    a) At least 5
    b) 10
    c) All 13 (including Rule 0) ✅
    d) Only 12

24. Which rule ensures a centralized system catalog?
    a) Rule 2
    b) Rule 4 ✅
    c) Rule 5
    d) Rule 9

25. Rule 6 and Rule 10 both deal with:
   a) Keys
   b) Constraints
   c) Data independence ✅
   d) Joins

26. Which of the following ensures that data integrity is enforced by DBMS and not application?
   a) Rule 6
   b) Rule 7 ✅
   c) Rule 11
   d) Rule 9

27. Rule 11 requires:
   a) Multiple languages for DB interaction
   b) One comprehensive language ✅
   c) No language
   d) Front-end scripting

28. Rule 5 ensures that a query language should allow:
   a) Only data retrieval
   b) Retrieval and storage
   c) Retrieval, manipulation, and constraint enforcement ✅
   d) None

29. Rule 9 requires that:
   a) Low-level record access must be used
   b) All manipulations must be possible at table level ✅
   c) Index must be used
   d) Logs must be generated

30. Why is the Non-subversion Rule important?
   a) For performance
   b) To enforce integrity through all interfaces ✅
   c) To reduce load
   d) To support legacy apps

31. Which rule addresses the update capability of views?
   a) Rule 8 ✅
   b) Rule 5
   c) Rule 7
   d) Rule 11

32. Rule 1 ensures that:
   a) No data duplication
   b) All data is stored in relational format ✅
   c) Data is indexed
   d) Keys are auto-generated

33. Logical data independence protects against changes in:
a) UI
b) Applications due to logical schema change ✅
c) System files
d) Hardware

34. Which rule promotes minimal dependence on physical storage?
a) Rule 6
b) Rule 10 ✅
c) Rule 11
d) Rule 12

35. Rule 4 emphasizes that:
a) Only admins can access metadata
b) Catalog should be accessible via standard language ✅
c) Catalog is locked
d) Catalog cannot be queried

36. Rule 7 separates:
a) User roles
b) Integrity from application ✅
c) Data from queries
d) Keys from indexes

37. Which rule emphasizes logical access to data?
a) Rule 2 ✅
b) Rule 1
c) Rule 5
d) Rule 12

38. The "Systematic treatment of nulls" includes:
a) Supporting NULL in calculations ✅
b) Eliminating NULLs
c) Ignoring NULLs
d) Treating NULL as 0

39. Which rule ensures that data retrieval should not need physical pointers?
a) Rule 10 ✅
b) Rule 3
c) Rule 2
d) Rule 6

40. Views are derived from:
a) Stored procedures
b) Base tables ✅
c) Triggers
d) Constraints

41. Rule 9 states that manipulations must be possible via:
    a) Stored procedures
    b) High-level language ✅
    c) Binary commands
    d) CLI tools

42. Rule 12 helps in preventing:
    a) System crashes
    b) Security loopholes ✅
    c) Constraint use
    d) Redundancy

43. Rule 11 implies that one language must support:
    a) Only data definition
    b) Data definition, manipulation, and constraint ✅
    c) Reporting only
    d) Formatting

44. Which rule is about comprehensive sub-language?
    a) Rule 11 ✅
    b) Rule 6
    c) Rule 8
    d) Rule 2

45. Which rule is often violated in non-relational DBMS?
    a) Rule 4 ✅
    b) Rule 1
    c) Rule 3
    d) Rule 6

46. Rule 0 is:
    a) Optional
    b) Prerequisite ✅
    c) Deprecated
    d) Replaced

47. What does Rule 5 ensure?
    a) UI functionality
    b) Powerful query capabilities ✅
    c) Backup processes
    d) Foreign key support

48. Rule 8 states that views should be:
    a) Derived from stored procedures
    b) Automatically created
    c) Updatable ✅
    d) Hidden

49. Rule 3 allows NULLs for:
    a) Key fields
    b) Missing or inapplicable values ✅
    c) Foreign key only
    d) Views

50. Why are Codd's rules still important?
    a) For designing front-end apps
    b) They define the foundation of true RDBMS ✅
    c) They enforce performance
    d) They replace SQL

Topic: Need for Normalization

1. What is the main goal of normalization in DBMS?
   a) Increase redundancy
   b) Improve performance
   c) Eliminate data redundancy ✅
   d) Merge tables

2. Normalization helps in:
   a) Data loss
   b) Data duplication
   c) Data consistency ✅
   d) Data corruption

3. Normalization improves:
   a) Data redundancy
   b) Data security
   c) Data integrity ✅
   d) Indexing

4. Which of the following is NOT a benefit of normalization?
   a) Reduced redundancy
   b) Increased data inconsistency ✅
   c) Easier maintenance
   d) Better organization

5. Normalization is a:
   a) One-time process
   b) Mathematical process ✅
   c) Data entry step
   d) Reporting task

6. First Normal Form (1NF) removes:
   a) Transitive dependencies

b) Partial dependencies
c) Multivalued attributes ✅
d) Redundant data

7. In 1NF, each cell of a table must:
a) Contain a primary key
b) Be null
c) Contain only atomic values ✅
d) Contain multiple values

8. Second Normal Form (2NF) deals with:
a) Transitive dependencies
b) Partial dependencies ✅
c) Functional dependencies
d) Primary keys

9. A table in 2NF must:
a) Be in 1NF ✅
b) Have a foreign key
c) Have no key
d) Be indexed

10. Partial dependency occurs when:
a) A non-key depends on whole key ✅
b) A non-key depends on part of composite key
c) A key depends on another key
d) A key depends on non-key

11. Third Normal Form (3NF) removes:
a) Partial dependencies
b) Composite keys
c) Transitive dependencies ✅
d) Foreign keys

12. Transitive dependency involves:
a) A → B and B → C implies A → C ✅
b) A → B implies B → A
c) B → A and A → B
d) A depends on C only

13. Which of the following normal forms is considered ideal for practical use?
a) 1NF
b) 2NF
c) 3NF ✅
d) 6NF

14. BCNF is a stricter version of:
a) 1NF
b) 2NF

c) 3NF ✅
d) 4NF

15. BCNF deals with:
a) Atomicity
b) Anomalies
c) Functional dependencies ✅
d) Multivalued dependencies

16. What is a normal form?
a) A way to format reports
b) A set of rules to organize tables ✅
c) A data visualization method
d) A form in the UI

17. What kind of anomalies does normalization remove?
a) Insert
b) Update
c) Delete
d) All of the above ✅

18. Insertion anomaly is:
a) Data lost while deleting
b) Cannot insert data due to missing fields ✅
c) Duplicate insertion
d) Unauthorized insertion

19. Update anomaly leads to:
a) Consistency
b) Redundancy
c) Conflicting data ✅
d) Faster retrieval

20. Deletion anomaly causes:
a) Incomplete deletion
b) Loss of useful data ✅
c) Excessive logging
d) Index corruption

21. Which is the lowest normal form?
a) 0NF ✅
b) 1NF
c) 2NF
d) 3NF

22. A table that is not normalized is in:
a) 1NF
b) Unstructured form

c) 0NF ✅
d) NULL

23. What is denormalization?
    a) Breaking tables
    b) Introducing redundancy intentionally ✅
    c) Creating more keys
    d) Backing up data

24. Why is denormalization sometimes used?
    a) To make data unstructured
    b) To speed up retrieval ✅
    c) To enforce constraints
    d) To reduce inconsistency

25. Which form handles multivalued dependencies?
    a) 2NF
    b) 3NF
    c) 4NF ✅
    d) 5NF

26. Which of the following is the correct order of normalization?
    a) 1NF → 2NF → 3NF → BCNF ✅
    b) 2NF → 1NF → 3NF
    c) 3NF → 2NF → BCNF
    d) BCNF → 1NF → 2NF

27. 1NF ensures that:
    a) Attributes are atomic ✅
    b) No partial dependency
    c) Referential integrity
    d) No foreign keys

28. 2NF ensures that:
    a) Data is sorted
    b) Table is in 1NF and no partial dependency ✅
    c) No transitive dependency
    d) Data is indexed

29. 3NF ensures that:
    a) Table is in 2NF and no transitive dependency ✅
    b) Primary keys exist
    c) Foreign keys are used
    d) Tables are large

30. BCNF ensures:
    a) One-to-many relationships
    b) Every determinant is a candidate key ✅

c) Referential integrity
d) Multivalued dependency

31. 5NF is also known as:
a) Project-join normal form ✅
b) Composite normal form
c) Advanced 3NF
d) Functional dependency form

32. Which normal form handles join dependencies?
a) 3NF
b) 4NF
c) 5NF ✅
d) BCNF

33. A relation in BCNF must also be in:
a) 1NF
b) 2NF
c) 3NF
d) All of the above ✅

34. Normalization is applied during:
a) Testing
b) Physical design
c) Logical database design ✅
d) Implementation

35. Which is the result of not using normalization?
a) Better performance
b) Anomalies ✅
c) Optimized queries
d) High security

36. Which type of dependency does BCNF resolve?
a) Functional dependency ✅
b) Multivalued dependency
c) Transitive dependency
d) Composite dependency

37. What is a candidate key?
a) A key that uniquely identifies tuples ✅
b) A backup key
c) A non-unique field
d) A partial key

38. What is a determinant?
a) A type of foreign key
b) An attribute on which others depend ✅

c) A calculated column
d) A redundant field

39. 4NF removes:
a) Multivalued dependency ✅
b) Transitive dependency
c) Functional dependency
d) Partial dependency

40. 5NF aims to:
a) Merge unrelated data
b) Reduce redundancy due to join dependency ✅
c) Increase redundancy
d) Normalize NULL values

41. Which is considered the strictest normal form?
a) 3NF
b) BCNF
c) 5NF ✅
d) 1NF

42. What does a violation of 1NF indicate?
a) Duplicate keys
b) Non-atomic values ✅
c) Null keys
d) Table with no fields

43. Which key helps in ensuring no partial dependency?
a) Foreign key
b) Candidate key
c) Primary key ✅
d) Alternate key

44. Which anomaly is eliminated first through normalization?
a) Insertion anomaly ✅
b) Deletion anomaly
c) Update anomaly
d) All of them

45. Which normal form is least often implemented in real-world systems?
a) 2NF
b) 3NF
c) 5NF ✅
d) 1NF

46. In what situation might denormalization be preferred?
a) When data integrity is needed
b) When query performance is more important ✅

c) When anomalies are needed
d) When table size must increase

47. Composite key is:
a) A key that combines multiple attributes ✅
b) A foreign key
c) A single column key
d) None

48. Decomposition in normalization is:
a) Splitting a table into smaller tables ✅
b) Deleting rows
c) Duplicating rows
d) Combining columns

49. Functional dependency is a condition where:
a) One attribute uniquely determines another ✅
b) Two tables are equal
c) Keys are swapped
d) Columns are indexed

50. Which dependency is resolved by 3NF?
a) Multivalued
b) Transitive ✅
c) Join
d) Redundancy

Topic: Data Models (Conceptual, Logical, Physical)

1. Which of the following is **not** a type of data model?
a) Conceptual
b) Logical
c) Philosophical ✅
d) Physical

2. The **conceptual data model** is primarily concerned with:
a) Implementation
b) Business requirements ✅
c) Indexing
d) Normalization

3. The **logical data model** focuses on:
a) Storage structure
b) Hardware configuration
c) Data entities, attributes, and relationships ✅
d) Operating systems

4. The **physical data model** deals with:
a) End-user queries

b) Storage and performance ✅
c) Data abstraction
d) Data types only

5. In which model are tables, columns, and relationships designed logically?
a) Physical
b) Logical ✅
c) Conceptual
d) Procedural

6. What is the main goal of a conceptual model?
a) Show how data will be stored
b) Show how data is used in business ✅
c) Determine file paths
d) Optimize performance

7. What does the logical model remove that exists in the conceptual model?
a) Relationships
b) User views
c) Redundancy ✅
d) Keys

8. Which of the following is the **most abstract** data model?
a) Physical
b) Logical
c) Conceptual ✅
d) Relational

9. The process of converting a conceptual model into a logical one is called:
a) Normalization
b) Transformation ✅
c) Indexing
d) Encoding

10. A physical model defines:
a) Tables and views
b) Business rules
c) How data is stored on disk ✅
d) Logical relationships

11. Data types and constraints are specified in:
a) Conceptual model
b) Logical model ✅
c) Physical model
d) Business model

12. Primary keys and foreign keys are typically introduced in:
a) Conceptual
b) Logical ✅

c) Physical
d) None

13. Indexes and partitions are examples of:
a) Logical components
b) Conceptual entities
c) Physical database objects ✅
d) Views

14. In which model are **entities and relationships** the main components?
a) Physical
b) Logical
c) Conceptual ✅
d) Tabular

15. Which model is used for **DBA and developers** during implementation?
a) Physical ✅
b) Conceptual
c) Logical
d) Object-Oriented

16. The logical data model is **derived from**:
a) Physical model
b) Conceptual model ✅
c) ER Diagram
d) Normalization

17. Data abstraction increases from:
a) Physical → Conceptual
b) Conceptual → Logical
c) Physical → Logical → Conceptual ✅
d) Logical → Physical → Conceptual

18. A **foreign key relationship** is first introduced in which model?
a) Conceptual
b) Logical ✅
c) Physical
d) Not in any model

19. Which model contains **technical metadata** like file size, location, and performance settings?
a) Logical
b) Conceptual
c) Physical ✅
d) Object-based

20. Which of the following is a **feature of conceptual model**?
a) Indexes
b) Cardinality ✅

c) File systems
d) Block size

21. A **developer** working on DB performance would focus on:
a) Logical model
b) Conceptual model
c) Physical model ✅
d) Abstract model

22. Which model represents **real-world entities** and their relationships?
a) Physical
b) Logical
c) Conceptual ✅
d) None

23. The term **"schema"** is mostly associated with which model?
a) Physical
b) Logical ✅
c) Conceptual
d) ERD

24. Which layer includes storage-level details such as RAID, tablespaces, or filegroups?
a) Physical ✅
b) Logical
c) Conceptual
d) None

25. Business analysts work mostly with:
a) Logical model
b) Conceptual model ✅
c) Physical model
d) Programming

26. Data integrity constraints are applied first in:
a) Conceptual
b) Logical ✅
c) Physical
d) ERD

27. Physical model adds:
a) Keys and constraints
b) Tables and fields
c) Indexing and storage options ✅
d) Data relationships

28. Conceptual model is **technology-independent**
a) True ✅
b) False

29. Which of the following describes a **logical independence**?
    a) Changing physical without affecting logical ✅
    b) Changing logical without affecting physical
    c) Removing constraints
    d) Adding hardware

30. The main tool for designing conceptual model is:
    a) SQL
    b) ER diagram ✅
    c) DDL
    d) XML

31. Logical design leads to:
    a) ER Diagram
    b) Normalized tables ✅
    c) Tablespace
    d) Index

32. Which model supports **normalization** rules?
    a) Physical
    b) Conceptual
    c) Logical ✅
    d) External

33. Unique and Not Null constraints are part of:
    a) Conceptual model
    b) Logical model ✅
    c) ER model
    d) File System

34. Physical model contains:
    a) Relationship names
    b) Attribute names
    c) Disk block size and file organization ✅
    d) ER symbols

35. The **transition order** of models is:
    a) Conceptual → Logical → Physical ✅
    b) Physical → Logical → Conceptual
    c) Logical → Physical → Conceptual
    d) Logical → Conceptual → Physical

36. Which model is closest to how the database is **actually implemented**?
    a) Conceptual
    b) Logical
    c) Physical ✅
    d) Object-Oriented

37. Developers often use **DDL (Data Definition Language)** in:
a) Conceptual model
b) Logical model
c) Physical model ✅
d) None

38. Which of the following represents a **field-level description** of data?
a) Conceptual
b) Logical ✅
c) Physical
d) ERD

39. Logical model is independent of:
a) Storage structures ✅
b) Entities
c) Data types
d) Relationships

40. Conceptual model represents:
a) Physical constraints
b) Application logic
c) Abstract structure of data ✅
d) SQL commands

41. A **logical ER model** includes:
a) Table normalization ✅
b) Physical partitions
c) Disk info
d) Buffer sizes

42. Data normalization occurs in:
a) Physical design
b) Logical model ✅
c) Conceptual model
d) Application layer

43. Foreign keys are part of:
a) Conceptual model
b) Logical and physical model ✅
c) Business design
d) Reports

44. Constraints such as check constraints and default values appear in:
a) Conceptual model
b) Physical model ✅
c) ERD
d) Logical only

45. Which of the following is least detailed?
a) Physical model
b) Logical model
c) Conceptual model ✅
d) All are equal

46. Which model acts as a bridge between business and technical teams?
a) Logical
b) Conceptual ✅
c) Physical
d) Internal

47. Entity names and attributes are first listed in the:
a) Logical model
b) Conceptual model ✅
c) Physical model
d) Relational model

48. Logical model supports:
a) Business decisions
b) Performance tuning
c) Normalized relational structure ✅
d) Disk allocation

49. Which model focuses on **data structures** and **relationships** without considering implementation?
a) Conceptual
b) Logical ✅
c) Physical
d) None

50. What is a major **limitation of conceptual models**?
a) Poor performance
b) Lack of storage details ✅
c) Too technical
d) No relationships

Topic: Database Design & Entity-Relationship Diagram (ERD)

✅ Database Design

1. What is the first step in database design?
a) Coding
b) Logical modeling
c) Requirement analysis ✅
d) ERD creation

2. Which of the following is the **correct order** of database design?
a) Physical → Conceptual → Logical
b) Conceptual → Logical → Physical ✅

c) Logical → Conceptual → Physical
d) Conceptual → Physical → Logical

3. A good database design eliminates:
a) Joins
b) Primary keys
c) Redundancy ✅
d) Indexes

4. What does a **poor database design** lead to?
a) Faster queries
b) Better normalization
c) Data anomalies ✅
d) Lower cost

5. Which normal form is usually sufficient in most database design cases?
a) 1NF
b) 2NF
c) 3NF ✅
d) 5NF

6. Logical database design is concerned with:
a) Storage engine
b) File systems
c) Structure of tables and relationships ✅
d) Disk size

7. Physical database design focuses on:
a) Attributes
b) Data relationships
c) Performance and storage ✅
d) UI requirements

8. Database design helps achieve:
a) Data inconsistency
b) Data redundancy
c) Data integrity ✅
d) Data confusion

9. What is the purpose of normalization in database design?
a) Add redundancy
b) Remove relationships
c) Organize data and reduce redundancy ✅
d) Speed up queries

10. Which tool is primarily used during **conceptual database design**?
a) SQL
b) ER Diagram ✅

c) Excel
d) Flowchart

✅ Entity-Relationship Diagram (ERD)

11. What does ERD stand for?
a) Entity Record Design
b) Entity-Relationship Diagram ✅
c) External Relation Data
d) Entity Row Diagram

12. In ER diagrams, **entities** are usually represented by:
a) Ovals
b) Diamonds
c) Rectangles ✅
d) Triangles

13. Attributes in ER diagrams are represented by:
a) Rectangles
b) Ellipses ✅
c) Lines
d) Triangles

14. A **relationship** between entities is represented by:
a) Ellipse
b) Diamond ✅
c) Rectangle
d) Arrow

15. A **weak entity** is represented by:
a) Bold rectangle
b) Double rectangle ✅
c) Dashed rectangle
d) Curved ellipse

16. The **key attribute** is underlined in:
a) ERD ✅
b) SQL
c) Relational model
d) Physical schema

17. Composite attributes can be:
a) Broken down into simpler attributes ✅
b) Ignored
c) Only used in physical model
d) Same as multivalued attributes

18. A multivalued attribute is represented by:
   a) Single ellipse
   b) Double ellipse ✅
   c) Rectangle
   d) Dashed line

19. A relationship where one entity is related to many instances of another is called:
   a) One-to-one
   b) Many-to-one
   c) One-to-many ✅
   d) Many-to-many

20. Many-to-many relationships require:
   a) A single table
   b) A linking table ✅
   c) Deletion
   d) Merge of entities

21. In ER diagrams, **total participation** is represented by:
   a) Solid line ✅
   b) Dashed line
   c) Double line
   d) Arrow

22. Which type of attribute **cannot be divided** further?
   a) Composite
   b) Multivalued
   c) Simple ✅
   d) Derived

23. A **derived attribute** is calculated from:
   a) SQL queries
   b) Foreign key
   c) Other stored attributes ✅
   d) Indexes

24. In ER diagrams, derived attributes are represented by:
   a) Dashed ellipse ✅
   b) Solid line
   c) Rectangle
   d) Circle

25. Which is **not** a valid cardinality in relationships?
   a) 1:1
   b) 1:N
   c) N:N
   d) M:0 ✅

26. In a strong entity set, the **primary key** is:
    a) Optional
    b) Not needed
    c) Mandatory ✔
    d) Always foreign

27. Generalization is the process of:
    a) Combining entities into a supertype ✔
    b) Creating new attributes
    c) Eliminating foreign keys
    d) Removing relationships

28. Specialization is the process of:
    a) Breaking down entity into sub-entities ✔
    b) Combining weak entities
    c) Merging rows
    d) Joining attributes

29. Aggregation is used when:
    a) Entities have weak keys
    b) A relationship has attributes ✔
    c) Attributes need joining
    d) A derived attribute exists

30. Which of the following is used to **connect attribute to entity**?
    a) Diamond
    b) Ellipse
    c) Line ✔
    d) Arrow

31. Weak entities must always have:
    a) No key
    b) Foreign key
    c) Partial key and identifying relationship ✔
    d) Composite key

32. An **identifying relationship** connects:
    a) Entity and attribute
    b) Strong entity and weak entity ✔
    c) Entity and derived attribute
    d) Foreign key and entity

33. Each attribute in an entity set must have a:
    a) Data type ✔
    b) Relationship
    c) Trigger
    d) Subtype

34. What does a **dashed line** from entity to relationship signify?
    a) Derived attribute
    b) Partial participation ✔
    c) Multivalued attribute
    d) Generalization

35. Which of the following is not a component of ERD?
    a) Entity
    b) Attribute
    c) Relationship
    d) File system ✔

36. The ER model is used for:
    a) Data entry
    b) Conceptual database design ✔
    c) Performance tuning
    d) Query processing

37. An attribute that uniquely identifies an entity is:
    a) Foreign key
    b) Candidate key ✔
    c) Multivalued key
    d) Derived key

38. Which is **not** a valid attribute type in ERD?
    a) Simple
    b) Composite
    c) Weak ✔
    d) Derived

39. Which tool is commonly used to create ER diagrams?
    a) MS Word
    b) Lucidchart / Draw.io ✔
    c) Adobe Illustrator
    d) MS Excel

40. Relationship multiplicity refers to:
    a) Number of tables
    b) Number of relationships
    c) Number of entity instances involved ✔
    d) Primary key usage

41. Which rule defines how many times an entity participates in a relationship?
    a) Generalization
    b) Participation constraint ✔
    c) Specialization
    d) Aggregation

42. Which attribute is not stored but can be calculated?

a) Composite
b) Derived ✅
c) Simple
d) Multivalued

43. Weak entities do not have:

a) Attributes
b) Relationship
c) Primary key ✅
d) Participation

44. Total participation means:

a) All instances must participate in the relationship ✅
b) Only some participate
c) Only keys participate
d) None participate

45. Inheritance in ERD is a result of:

a) Aggregation
b) Generalization/Specialization ✅
c) Decomposition
d) Weak entity

46. Which is not a type of attribute in ERD?

a) Simple
b) Multivalued
c) Derived
d) Triggered ✅

47. A candidate key can become a:

a) Foreign key
b) Primary key ✅
c) Derived key
d) Composite key

48. Redundant data is avoided in ERD by:

a) Generalization ✅
b) Partial dependency
c) Multivalued attributes
d) Derived fields

49. The key difference between weak and strong entities is:

a) Attribute count
b) Presence of primary key ✅
c) Relationship type
d) Data type

50. A ternary relationship involves:
    a) 2 entities
    b) 1 entity
    c) 3 entities ✅
    d) No entities

Topic: Data Flow Diagrams (DFD)

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1. What does DFD stand for?
   a) Data File Design
   b) Data Flow Diagram ✅
   c) Document Flow Diagram
   d) Data Form Design
2. What is the primary use of a DFD?
   a) Describe database schema
   b) Represent flow of data in a system ✅
   c) Create ER models
   d) Define software classes
3. Which of the following is **not a component** of a DFD?
   a) Process
   b) Data Flow
   c) Decision Box ✅
   d) Data Store
4. A **data store** in DFD is represented by:
   a) Oval
   b) Rectangle
   c) Open-ended rectangle ✅
   d) Diamond
5. An **external entity** is represented by:
   a) Rectangle ✅
   b) Arrow
   c) Circle
   d) Square
6. Which shape is used to represent a **process** in DFD?
   a) Arrow
   b) Circle or rounded rectangle ✅

c) Diamond
d) Double ellipse

7. A DFD does not include:
a) Control flow ✅
b) Data flow
c) Processes
d) Entities

8. What does a **level-0 DFD** represent?
a) Detailed system
b) Top-level system overview ✅
c) Programming logic
d) Database schema

9. A level-0 DFD is also known as:
a) Logical DFD
b) Physical DFD
c) Context Diagram ✅
d) Flowchart

10. Which DFD shows **in-depth details** of the processes?
a) Level-0
b) Level-1 ✅
c) Context diagram
d) Block diagram

11. In DFD, **data flows** are represented by:
a) Solid circles
b) Arrows ✅
c) Dashed lines
d) Ovals

12. The arrow in a DFD denotes:
a) Process
b) Data Flow ✅
c) Decision
d) Relation

13. A DFD that includes technical details like hardware is called:
a) Logical DFD
b) Physical DFD ✅
c) Context diagram
d) ERD

14. A **logical DFD** focuses on:
a) What happens in the system ✅
b) How it is implemented

c) Which hardware is used
d) Where the system is hosted

15. Which DFD shows **how the system will be implemented**?
a) Logical
b) Physical ✅
c) Context
d) None

16. A **process** in DFD must have:
a) Only input
b) Only output
c) At least one input and one output ✅
d) No input or output

17. What is the rule for **naming a process** in DFD?
a) Verb-noun form ✅
b) Noun only
c) Noun-verb
d) Abbreviation

18. External entities must be:
a) Part of the internal system
b) Connected only to data stores
c) Outside the system boundary ✅
d) Inside only for level-1

19. Data stores are typically named with:
a) Verbs
b) Adjectives
c) Nouns ✅
d) Code

20. A DFD helps in:
a) Writing code
b) Optimizing SQL
c) Understanding system functionality ✅
d) Building hardware

21. Data must **always flow** between:
a) Process and data flow
b) Two processes
c) Process and external entity or store ✅
d) Data stores directly

22. In a DFD, **data should not flow**:
a) From process to store
b) From process to entity

c) Directly between stores ✅
d) From process to process

23. A DFD is NOT used for:
a) System analysis
b) Database design ✅
c) Communication
d) Documentation

24. Which DFD level provides **functional decomposition** of processes?
a) Level-0
b) Level-1 ✅
c) Physical
d) Context

25. A DFD does NOT show:
a) Data sources
b) Data destinations
c) System hardware ✅
d) Data transformations

26. What is **balancing** in DFDs?
a) Ensuring same number of entities
b) Keeping data flow names consistent ✅
c) Drawing symmetric diagrams
d) Maintaining shapes

27. Which of the following is an example of a **data store**?
a) Customer
b) Inventory ✅
c) Print Invoice
d) Online Order

28. Which component is used for **transformation of data**?
a) Process ✅
b) Data store
c) Data flow
d) External entity

29. The **context diagram** has how many processes?
a) 2
b) 3
c) 1 ✅
d) Unlimited

30. Who mainly uses DFDs during development?
a) Graphic designers
b) Front-end developers

c) System analysts ✅
d) QA engineers

31. Which type of DFD focuses on **business view** of a system?
a) Logical ✅
b) Physical
c) Context
d) All of them

32. In a DFD, **loops**:
a) Are mandatory
b) Must be avoided ✅
c) Improve clarity
d) Are allowed only in context diagram

33. Which DFD level is used to add **sub-processes**?
a) Level-1 ✅
b) Level-0
c) Physical
d) Logical

34. Processes in DFD should be **numbered** to:
a) Show hierarchy ✅
b) Optimize data flow
c) Replace labels
d) Group entities

35. A DFD should **not show**:
a) Storage mechanisms ✅
b) External inputs
c) System functionality
d) Data outputs

36. Which symbol represents **data movement** in DFD?
a) Arrow ✅
b) Square
c) Line
d) Dashed circle

37. What does DFD **not help** with?
a) System behavior
b) Code structure ✅
c) User interaction
d) Data input/output

38. In DFDs, **system boundaries** are established using:
a) Circles
b) Rectangles

c) Boxes enclosing the entire diagram ✅
d) Arrows

39. One benefit of DFDs is:
a) Shows database schema
b) Reduces coding time
c) Simplifies complex processes ✅
d) Generates source code

40. Which is NOT a correct pairing?
a) Process – Circle
b) Data Store – Open-ended rectangle
c) Data Flow – Dashed line ✅
d) External Entity – Rectangle

41. Arrows in DFD should always be:
a) Labeled ✅
b) Curved
c) Unidirectional
d) Dotted

42. What is a common **mistake** in DFDs?
a) Showing multiple processes
b) Missing labels on flows ✅
c) Including too many stores
d) Drawing external entities

43. Which of the following **must be avoided** in DFDs?
a) Direct store-to-store data flow ✅
b) Store-to-process flow
c) Process-to-process flow
d) Entity-to-process flow

44. The highest abstraction level in DFD is:
a) Level-1
b) Level-0 ✅
c) Level-2
d) Context flow

45. A process that doesn't **change the data** is called a:
a) Valid process
b) Blackhole ✅
c) Store
d) Loop

46. DFD diagrams use:
a) Unified Modeling Language
b) Structured design techniques ✅

c) Object-oriented symbols
d) HTML flow

47. A process that sends data but receives nothing is:
a) Loop
b) Source
c) Spontaneous generation ✅
d) Sink

48. A process with no output is called:
a) Spontaneous generation
b) Black hole ✅
c) Data loop
d) External trigger

49. DFD helps in designing:
a) Physical schema
b) System architecture ✅
c) Web UI
d) NoSQL documents

50. A **sink** in DFD is:
a) A type of process
b) An output-only entity ✅
c) Input-only process
d) Bi-directional flow

Normalization – Part 1: 1NF and 2NF

✅ 1st Normal Form (1NF)

1. What is the main requirement for a table to be in **1st Normal Form**?
a) No transitive dependency
b) Atomic values only ✅
c) Composite keys
d) No null values

2. Which of the following **violates 1NF**?
a) Repeating groups ✅
b) Unique rows
c) Primary keys
d) Foreign keys

3. A relation is in 1NF if:
a) It has a primary key
b) It contains atomic values only ✅
c) It has foreign keys
d) It is free of nulls

4. Which of the following would cause a table to **not be in 1NF**?
   a) NULL values
   b) Multivalued attributes ✅
   c) Foreign keys
   d) Candidate keys
5. The first normal form eliminates:
   a) Redundant data
   b) Composite keys
   c) Repeating groups ✅
   d) Foreign keys
6. Which of the following is an example of **non-atomic value**?
   a) “123 Main St”
   b) “Red, Blue” ✅
   c) 42
   d) “YES”
7. The rule of atomicity means:
   a) No foreign keys
   b) No duplicates
   c) Each field should contain indivisible values ✅
   d) Use of primary key
8. In 1NF, columns must:
   a) Be indexed
   b) Have foreign keys
   c) Store only single values ✅
   d) Store unique values only
9. What is a common **mistake** when designing a table not in 1NF?
   a) Including derived attributes
   b) Allowing multiple values in a single field ✅
   c) Defining primary key
   d) Using normalization
10. What is the **main benefit** of applying 1NF?
   a) Fast querying
   b) Removal of redundancy
   c) Ensures atomic values ✅
   d) Avoids foreign key usage

✅ 2nd Normal Form (2NF)

11. A relation is in 2NF if:
   a) It is in 1NF and has no partial dependency ✅
   b) It is in 3NF

c) It has foreign keys
d) It has no nulls

12. 2NF applies only to:
a) Relations with a single primary key
b) Relations with composite primary keys ✅
c) Relations with foreign keys
d) Normalized tables

13. Which of the following causes a violation of 2NF?
a) Transitive dependency
b) Composite keys
c) Partial dependency ✅
d) Redundant keys

14. Partial dependency occurs when:
a) A non-prime attribute depends on part of a composite key ✅
b) A key depends on a non-key
c) A foreign key is null
d) A relation has a candidate key

15. Which of the following is **not eliminated** in 2NF?
a) Transitive dependency ✅
b) Partial dependency
c) Repeating groups
d) Multivalued attributes

16. A relation in 1NF but **not** in 2NF will have:
a) Transitive dependency
b) Composite keys
c) Partial dependency ✅
d) No primary key

17. A table is in 2NF if:
a) It is in 1NF and each non-prime attribute depends on the whole key ✅
b) It is in 1NF and has unique rows
c) It has no foreign key
d) It is in BCNF

18. A **prime attribute** is:
a) Derived
b) Part of a foreign key
c) Part of any candidate key ✅
d) A nullable field

19. The **goal of 2NF** is to eliminate:
a) Composite keys
b) Redundant foreign keys

c) Partial dependencies ✅
d) Atomicity

20. To convert from 1NF to 2NF, we must:
a) Remove transitive dependencies
b) Add surrogate keys
c) Remove partial dependencies ✅
d) Normalize foreign keys

✅ 1NF & 2NF Conceptual & Practical Scenarios

21. Which of the following tables **violates 1NF**?

OrderID	ProductNames
101	"Pen, Pencil"

a) No
b) Yes ✅

22. What is the **correct step** to bring the above table to 1NF?
a) Combine rows
b) Break ProductNames into separate rows ✅
c) Normalize to 3NF
d) Add foreign key

23. A table with OrderID and ProductName where each OrderID has only one ProductName is:
a) Not in 1NF
b) In 1NF ✅
c) In 2NF
d) In 3NF

24. Consider this table:

RollNo	Subject	Instructor
101	Math	Mr. A
101	Science	Mr. B

This table is:
a) Not in 1NF
b) In 1NF ✅
c) In 2NF
d) In 3NF

25. Now if **Instructor depends only on Subject**, not RollNo, the table is:
a) In 2NF
b) Not in 2NF ✅

c) In 1NF
d) In 3NF

26. In 2NF, each **non-key attribute** must depend on:
a) Partial key
b) Foreign key
c) Full primary key ✅
d) Derived attribute

27. Converting to 2NF typically requires:
a) Merging tables
b) Splitting tables ✅
c) Adding keys
d) Indexing

28. A table with a single-column primary key and no multivalued attributes is:
a) Already in 2NF ✅
b) In 3NF
c) In 1NF
d) Not normalized

29. Which of the following is an example of **partial dependency**?
a) StudentID, CourseCode → Grade; CourseName depends only on CourseCode ✅
b) A → B, B → C
c) A → B, C → D
d) No dependency at all

30. What is the **best strategy** to eliminate partial dependency?
a) Remove multivalued fields
b) Split relation into smaller ones ✅
c) Merge columns
d) Add primary keys

✅ True/False and Fill-in-the-Blank Style

31. 1NF allows multivalued attributes.
❌ False ✅

32. 2NF removes **partial** dependencies.
✅ True ✅

33. If a table is in 2NF, it is also in 1NF.
✅ True ✅

34. A field storing "apple, banana" violates 1NF.
✅ True ✅

35. A relation having only one candidate key can't have partial dependency.
✅ True ✅

36. Full functional dependency is a requirement for:
    → **2NF** ✅

37. Composite keys often introduce:
    → **Partial dependencies** ✅

38. Splitting a table to remove non-atomic values results in:
    → **1NF** ✅

39. Partial dependency can lead to:
    → **Redundancy** ✅

40. The process of removing repeating groups is associated with:
    → **1NF** ✅

✅ **More Conceptual**

41. 1NF → 2NF deals with:
    a) Multivalued to atomic
    b) Partial to full dependencies ✅
    c) Foreign key optimization
    d) Transitive removal

42. The data integrity rule strengthened by 2NF is:
    a) Domain
    b) Entity
    c) Referential
    d) Functional ✅

43. Which field causes partial dependency in:

| StudentID | CourseID | Instructor | Grade |
Instructor depends only on CourseID

a) Grade
b) Instructor ✅
c) StudentID
d) CourseID

44. Full functional dependency means:
    a) One field determines the rest
    b) All non-keys depend on full primary key ✅
    c) Foreign key relationship
    d) Composite attributes

45. 2NF helps in eliminating which anomaly?
    a) Insert
    b) Update

c) Delete
d) All of the above ✅

46. Which anomaly results from storing repeated group data?
a) Update ✅
b) Insert
c) Delete
d) None

47. In 1NF, if every column is atomic but has partial dependency, then:
a) It is in 2NF
b) Not in 2NF ✅
c) In 3NF
d) Unnormalized

48. What happens if you ignore 2NF?
a) No problem
b) Storage savings
c) Anomalies during updates ✅
d) Better performance

49. Which field type often leads to violating 1NF?
a) Numeric
b) Text
c) Multivalued ✅
d) Boolean

50. Ensuring full functional dependency improves:
a) Data duplication
b) Data retrieval
c) Logical consistency ✅
d) Query speed

Normalization – Part 2: 3NF, BCNF, and 4NF

✅ 3rd Normal Form (3NF)

1. A relation is in 3NF if:
a) It is in 2NF and has no transitive dependency ✅
b) It is in 2NF and has no foreign keys
c) All attributes are atomic
d) It has a candidate key

2. What is **transitive dependency**?
a) A → B and B → C implies A → C ✅
b) A → C and A → B implies B → C
c) A → A
d) B → A and A → C

3. Which of the following **violates 3NF**?
   a) A non-prime attribute depending on another non-prime attribute ✅
   b) Partial dependency
   c) Composite keys
   d) Atomic values

4. Which anomaly is commonly avoided by 3NF?
   a) Deadlocks
   b) Transitive updates ✅
   c) Redundant primary keys
   d) Cross joins

5. Transitive dependencies occur when:
   a) A → B and B → C ✅
   b) A → A
   c) A → B and B ⊄ A
   d) A → C

6. 3NF removes:
   a) Only partial dependencies
   b) Only multivalued dependencies
   c) Transitive dependencies ✅
   d) All attributes

7. Which of the following is a **valid transitive dependency**?
   a) StudentID → DeptID, DeptID → DeptName ✅
   b) RollNo → Marks
   c) Name → Name
   d) Email → RollNo

8. Transitive dependency must involve:
   a) Prime attributes
   b) Foreign keys
   c) Non-prime attributes ✅
   d) Derived attributes

9. What is the main goal of 3NF?
   a) Avoid null values
   b) Remove foreign keys
   c) Eliminate transitive dependencies ✅
   d) Use surrogate keys

10. To move from 2NF to 3NF, we:
    a) Remove partial dependencies
    b) Remove transitive dependencies ✅
    c) Normalize primary key
    d) De-normalize

✅ BCNF (Boyce-Codd Normal Form)

11. A relation is in BCNF if:
a) It is in 3NF and every determinant is a candidate key ✅
b) It is in 2NF only
c) It has no primary key
d) It avoids redundancy

12. BCNF is a stricter version of:
a) 1NF
b) 2NF
c) 3NF ✅
d) 4NF

13. Which of the following must be a **candidate key in BCNF**?
a) Every foreign key
b) Every determinant ✅
c) All non-prime attributes
d) All multivalued fields

14. In 3NF, **a determinant** that is not a candidate key is:
a) Allowed
b) Violation of BCNF ✅
c) Transitive
d) Composite

15. Which situation causes a **3NF table to violate BCNF**?
a) A candidate key has partial dependency
b) Non-prime attribute determines a key
c) Non-candidate key determines another attribute ✅
d) Duplicate values

16. Which form guarantees **no redundancy due to functional dependencies**?
a) 2NF
b) 3NF
c) BCNF ✅
d) 1NF

17. A table with overlapping candidate keys might violate:
a) 3NF
b) BCNF ✅
c) 2NF
d) 4NF

18. Every relation in BCNF is also in:
a) 1NF
b) 2NF
c) 3NF
d) All of the above ✅

19. Which of the following is **not a condition** for BCNF?
    a) 1NF satisfied
    b) All dependencies are functional
    c) Determinants must be candidate keys ✅
    d) No transitive dependencies

20. BCNF helps eliminate:
    a) Multivalued dependencies
    b) Repeating groups
    c) Anomalies due to non-candidate keys determining attributes ✅
    d) Recursive joins

✅ 4th Normal Form (4NF)

21. A relation is in 4NF if:
    a) It is in BCNF and has no multivalued dependencies ✅
    b) It is in 3NF and transitive-free
    c) It has only atomic attributes
    d) No foreign key exists

22. 4NF addresses which type of dependency?
    a) Transitive
    b) Functional
    c) Multivalued ✅
    d) Composite

23. Multivalued dependency is different from:
    a) Transitive
    b) Partial
    c) Functional ✅
    d) None

24. Which of the following indicates a **multivalued dependency**?
    a) A →→ B ✅
    b) A → B
    c) A ⇌ B
    d) A ↦ B

25. A multivalued dependency implies:
    a) One attribute uniquely determines two unrelated attributes ✅
    b) Two attributes determine a key
    c) A key is foreign
    d) Derived fields exist

26. To remove multivalued dependencies, we:
    a) Decompose the relation into multiple tables ✅
    b) Normalize to 2NF

c) Use joins
d) Add primary keys

27. Multivalued dependencies occur when:
a) One entity relates to multiple unrelated values ✅
b) Two values are in a 1:1 relation
c) Transitive dependencies exist
d) Foreign keys are missing

28. Which is true about 4NF?
a) Handles redundancy due to transitive dependency
b) It’s the same as BCNF
c) Eliminates multivalued dependencies ✅
d) Allows partial dependency

29. A relation in BCNF but **not in 4NF** may have:
a) Partial dependency
b) Transitive dependency
c) Multivalued dependency ✅
d) Circular references

30. When multiple independent multivalued facts exist for one key, it's best to:
a) Keep in one table
b) Break into multiple relations ✅
c) Use denormalization
d) Store as arrays

✅ Conceptual & Scenario-Based

31. A table with **Student** →→ **Hobby** and **Student** →→ **Language** indicates:
a) 2NF
b) BCNF
c) Violation of 4NF ✅
d) Functional dependency

32. If a non-prime attribute determines another, it violates:
a) 1NF
b) 3NF ✅
c) BCNF
d) 4NF

33. Which is more powerful — BCNF or 3NF?
a) 3NF
b) BCNF ✅
c) They are equal
d) Depends on context

34. Which comes first in normalization sequence?
    a) BCNF
    b) 3NF ✅
    c) 4NF
    d) 5NF

35. What is a **drawback** of reaching 4NF?
    a) Better speed
    b) Data redundancy
    c) Too many joins ✅
    d) Bigger tables

36. BCNF ensures:
    a) No transitive dependencies
    b) All determinants are super keys ✅
    c) No foreign keys
    d) No joins

37. If A →→ B and A →→ C and B ⊥ C, then the relation is:
    a) In BCNF
    b) In 3NF
    c) Not in 4NF ✅
    d) De-normalized

38. Which is **not a multivalued dependency**?
    a) A →→ B
    b) A →→ C
    c) A → B ✅
    d) A →→ D

39. Why might BCNF not be sufficient in some cases?
    a) It allows multivalued dependencies ✅
    b) It allows repeating groups
    c) It allows composite keys
    d) It allows NULLs

40. Which of the following violates 4NF but not BCNF?
    a) Transitive dependency
    b) Functional dependency
    c) Multivalued dependency ✅
    d) Primary key duplication

✅ True/False and Fill-in-the-Blanks

41. 3NF removes transitive dependencies. ✅ True

42. BCNF removes partial and transitive dependencies. ❌ False (only determinant constraints)

43. 4NF is concerned with multivalued dependencies. ✅ True

44. BCNF ensures all determinants are candidate keys. ✅ True

45. Every 3NF relation is also in BCNF. ❌ False

46. Functional dependency A → B is transitive if B → C also exists. ✅ True

47. 4NF is stricter than BCNF. ✅ True

48. 3NF ensures foreign keys. ❌ False

49. Multivalued dependency means one attribute determines unrelated sets. ✅ True

50. BCNF still allows transitive dependencies. ❌ False

Normalization – Part 3: Denormalization

✅ Definition and Concepts

1. What is denormalization?
   a) Normalization beyond 4NF
   b) Reverting normalized tables into a more redundant structure ✅
   c) Removing foreign keys
   d) Merging primary keys

2. Denormalization is typically done to:
   a) Decrease redundancy
   b) Optimize read performance ✅
   c) Avoid primary keys
   d) Improve write performance

3. Which of the following is a **consequence of denormalization**?
   a) Less redundancy
   b) Higher normalization
   c) Data redundancy ✅
   d) More normalization

4. Denormalization can improve:
   a) Write speed
   b) Query performance ✅
   c) Storage usage
   d) Data independence

5. Which of the following is **not a reason to denormalize**?
   a) Improve reporting speed
   b) Improve performance
   c) Enforce strict integrity ✅
   d) Reduce complex joins

6. What is a **typical trade-off** when denormalizing?
   a) Data consistency vs performance ✅
   b) Indexes vs keys
   c) Queries vs UI
   d) Redundancy vs deletion

7. Denormalization increases:
   a) Data consistency
   b) Update anomalies ✅
   c) Data integrity
   d) Referential security

8. Denormalization is often used in:
   a) OLTP systems
   b) OLAP systems ✅
   c) File systems
   d) Blockchains

9. Denormalization should be used:
   a) Always
   b) Never
   c) After careful performance analysis ✅
   d) After backup

10. Which of these is a **risk of denormalization**?
    a) More CPU usage
    b) Higher join time
    c) Data anomalies ✅
    d) Reduced performance

✅ Scenarios and Use Cases

11. Which of the following is a **valid reason** to denormalize a database?
    a) To improve referential integrity
    b) To reduce disk usage
    c) To improve read performance ✅
    d) To ensure 3NF compliance

12. In a denormalized structure, joins are:
    a) More frequent
    b) Less frequent ✅
    c) More efficient
    d) Needed always

13. One denormalization technique is:
    a) Using composite keys
    b) Splitting tables

c) Combining tables ✅
d) Replacing primary keys

14. Which anomaly is most likely after denormalization?
    a) Transitive
    b) Insertion
    c) Update ✅
    d) Normalization

15. A denormalized table may store:
    a) Derived attributes ✅
    b) Constraints
    c) Only primary keys
    d) Only foreign keys

16. Reporting applications prefer:
    a) 1NF
    b) Fully normalized schema
    c) Denormalized schema ✅
    d) Indexed schema

17. What should be considered before denormalizing?
    a) Storage size
    b) Query frequency ✅
    c) User count
    d) UI design

18. Redundant data may cause:
    a) Insert anomaly
    b) Update anomaly ✅
    c) Delete anomaly
    d) Key violation

19. Denormalization is preferred when:
    a) Query performance is low ✅
    b) Database is normalized
    c) Data is small
    d) Joins are fast

20. In a normalized database, which issue is **reduced**?
    a) Data duplication ✅
    b) Read speed
    c) Foreign key usage
    d) Table count

✅ Technical and Practical Implications

21. Denormalization can **increase**:
a) Write efficiency
b) Read complexity
c) Storage requirement ✅
d) Functional dependency

22. Denormalization often leads to:
a) Reduced indexing
b) Improved query joins ✅
c) More nulls
d) Fewer attributes

23. Which of the following is most often **duplicated** after denormalization?
a) Primary keys
b) Foreign keys
c) Non-key data ✅
d) NULLs

24. To denormalize, developers may:
a) Split tables
b) Merge relations ✅
c) Normalize again
d) Remove primary keys

25. Denormalization helps avoid:
a) Indexing
b) Too many joins ✅
c) Functional dependencies
d) Surrogate keys

26. What is the major **downside** of denormalization?
a) Faster inserts
b) Easier constraints
c) Redundant data ✅
d) Better memory

27. Denormalization leads to:
a) Simplified schema
b) Higher storage ✅
c) Normal form promotion
d) Table splitting

28. Denormalization is common in:
a) Online Transaction Processing
b) Online Analytical Processing ✅
c) Data migration
d) File processing

29. Denormalized data can impact:
    a) Foreign key enforcement ✅
    b) Aggregation
    c) Metadata
    d) Authentication

30. When denormalizing, you must:
    a) Add more keys
    b) Remove all dependencies
    c) Maintain integrity manually ✅
    d) Normalize to 3NF

✅ Fill-in-the-Blanks / True/False

31. Denormalization may violate normalization rules. ✅ True

32. Denormalization increases redundancy. ✅ True

33. Denormalization improves data security. ❌ False

34. Denormalization is the opposite of normalization. ✅ True

35. A denormalized schema needs fewer joins. ✅ True

36. Denormalization ensures data accuracy. ❌ False

37. Denormalized tables may contain duplicate information. ✅ True

38. The biggest benefit of denormalization is performance improvement. ✅ True

39. Denormalization is best for OLTP systems. ❌ False

40. Join operations reduce in denormalized databases. ✅ True

✅ Comparisons and Theoretical

41. Denormalization is better than normalization when:
    a) Transaction speed matters
    b) Analysis/reporting is the main focus ✅
    c) Data volume is small
    d) Relationships are weak

42. What is lost during denormalization?
    a) Functional dependency
    b) Data integrity ✅
    c) Joins
    d) Constraints

43. Normalization is preferred when:
    a) Query speed is low

b) Write integrity is high ✅
c) Users are less
d) Size is big

44. Denormalized data often results in:
a) Null-free schema
b) Query optimization ✅
c) Single table design
d) Normalized indexes

45. Which is NOT a denormalization method?
a) Column duplication
b) Derived column addition
c) Relation merging
d) Splitting relations ✅

46. When joining denormalized tables, you typically:
a) Avoid joins ✅
b) Use foreign keys
c) Use indexes
d) Normalize first

47. Which is the primary concern in denormalized DBs?
a) Aggregation
b) Data duplication ✅
c) Schema size
d) Disk format

48. A good reason to denormalize is when:
a) Table count exceeds limit
b) Reporting slows down due to joins ✅
c) Joins are optimized
d) All data is indexed

49. To maintain accuracy in denormalized DBs, you must:
a) Use views
b) Use triggers ✅
c) Denormalize more
d) Add NULLs

50. Denormalization often violates which normal form?
a) 1NF
b) 2NF
c) 3NF ✅
d) 5NF

Session 4: DDL, DML & DCL Commands

✅ PART A: DDL – Data Definition Language

1. Which of the following is a DDL command?
   a) SELECT
   b) INSERT
   c) CREATE ✔
   d) UPDATE

2. DDL is used to:
   a) Control user access
   b) Define and modify database structure ✔
   c) Manipulate data
   d) Query data

3. Which command is used to create a new table?
   a) NEW
   b) CREATE ✔
   c) ADD
   d) MAKE

4. Which command **removes** the entire table from the database?
   a) DELETE
   b) ERASE
   c) DROP ✔
   d) REMOVE

5. What does the ALTER command do?
   a) Adds new records
   b) Modifies table structure ✔
   c) Removes indexes
   d) Rolls back changes

6. Which DDL command is used to remove **only the data**, not the table structure?
   a) TRUNCATE ✔
   b) DELETE
   c) DROP
   d) REMOVE

7. Which DDL command is **irreversible**?
   a) DELETE
   b) TRUNCATE
   c) DROP ✔
   d) UPDATE

8. The keyword used to change a column’s data type is:
   a) RENAME
   b) CHANGE
   c) MODIFY ✔
   d) SET

9. Which statement is correct about TRUNCATE?
   a) It is slower than DELETE
   b) It removes table
   c) It resets auto-increment ✅
   d) It uses WHERE clause

10. Which command can **rename a table**?
   a) CHANGE
   b) UPDATE
   c) ALTER TABLE RENAME TO ✅
   d) MODIFY

11. DDL statements are:
   a) Auto-committed ✅
   b) Rollback-compatible
   c) Savepoint based
   d) Used for reports

12. Which clause is used with CREATE to add a constraint?
   a) WITH
   b) LIMIT
   c) CONSTRAINT ✅
   d) BIND

13. A foreign key is created using:
   a) ADD COLUMN
   b) ALTER
   c) CONSTRAINT FOREIGN KEY ✅
   d) SET RELATION

14. Can DDL be used to create indexes?
   a) No
   b) Yes ✅
   c) Only via triggers
   d) Only by admin

15. What does DROP DATABASE do?
   a) Deletes all data
   b) Deletes one table
   c) Deletes the entire database ✅
   d) Deletes schema

16. Which DDL statement adds a column to a table?
   a) ALTER TABLE ADD COLUMN ✅
   b) MODIFY TABLE
   c) INSERT COLUMN
   d) UPDATE TABLE

17. Which of the following does NOT belong to DDL?
a) CREATE
b) DROP
c) INSERT ✅
d) ALTER

18. Which command is used to create a new index?
a) MAKE INDEX
b) CREATE INDEX ✅
c) ADD INDEX
d) FORM INDEX

19. DDL changes can be undone using ROLLBACK.
❌ False ✅

20. The CREATE TABLE command is used to:
a) Add new row
b) Create new table ✅
c) Change table name
d) Join tables

21. Which of the following is not a valid DDL command?
a) ALTER
b) DELETE ✅
c) DROP
d) CREATE

22. Which DDL command **removes all rows but keeps table structure**?
a) DELETE
b) TRUNCATE ✅
c) REMOVE
d) DROP

23. Which statement is TRUE about DROP and TRUNCATE?
a) Both remove data and structure
b) DROP removes structure, TRUNCATE retains ✅
c) Both are reversible
d) Both are DML

24. Which command **adds a constraint** to an existing column?
a) ADD KEY
b) ALTER TABLE … ADD CONSTRAINT ✅
c) INSERT CONSTRAINT
d) DEFINE

25. DDL stands for:
→ **Data Definition Language** ✅

26. A table created without constraints:
  a) Is not allowed
  b) Is valid but not safe ✅
  c) Fails on run
  d) Cannot be queried

27. What happens if a DROP is issued on a table with dependencies?
  a) It drops only the data
  b) It errors out unless CASCADE is used ✅
  c) It renames the table
  d) It truncates the table

28. ALTER TABLE can be used to:
  a) Modify rows
  b) Add/modify columns ✅
  c) Filter data
  d) Merge tables

29. What is the purpose of the COMMENT clause in DDL?
  a) To write logs
  b) To document tables/columns ✅
  c) To export schema
  d) To join tables

30. Which of the following is **auto-committed**?
  a) DML
  b) DDL ✅
  c) DCL
  d) TCL

31. Adding constraints during creation is done via:
  a) KEY
  b) CONSTRAINT keyword ✅
  c) MODIFY
  d) TRIGGER

32. What does the CASCADE option do in DROP?
  a) Adds a cascade join
  b) Drops dependent objects too ✅
  c) Prevents drop
  d) Restores data

33. DDL is processed by the:
  a) Parser
  b) DDL compiler ✅
  c) Optimizer
  d) Transaction manager

34. CREATE DATABASE is a:
    a) DML
    b) DCL
    c) DDL ✅
    d) TCL

35. Which of the following is stored in system catalog?
    a) DML logs
    b) DDL metadata ✅
    c) Transactions
    d) Joins

✅ PART B: DML – Data Manipulation Language

36. Which of the following is a DML command?
    a) CREATE
    b) INSERT ✅
    c) DROP
    d) GRANT

37. DML is used to:
    a) Define schema
    b) Control access
    c) Manipulate data ✅
    d) Lock tables

38. Which command is used to remove specific rows?
    a) TRUNCATE
    b) DROP
    c) DELETE ✅
    d) ERASE

39. Which command is used to change data in a table?
    a) ALTER
    b) UPDATE ✅
    c) SET
    d) CREATE

40. INSERT adds:
    a) A column
    b) A row ✅
    c) A table
    d) A constraint

41. DELETE without a WHERE clause:
    a) Deletes structure
    b) Deletes all rows ✅

c) Fails
d) Deletes table

42. Which command is used to modify data?
a) CHANGE
b) MODIFY
c) UPDATE ✅
d) TRUNCATE

43. Can you rollback an UPDATE?
a) Yes ✅
b) No
c) Only if committed
d) Only for new rows

44. INSERT INTO requires:
a) WHERE
b) SET
c) VALUES ✅
d) TRIGGER

45. Which is **not a DML**?
a) UPDATE
b) SELECT
c) CREATE ✅
d) DELETE

46. Which clause is required with DELETE to avoid full table deletion?
a) SET
b) CHECK
c) WHERE ✅
d) HAVING

47. INSERT can be done using:
a) VALUES ✅
b) GROUP BY
c) JOIN
d) ALTER

48. Which command retrieves data from the table?
a) INSERT
b) SELECT ✅
c) FETCH
d) GET

49. INSERT INTO ... SELECT ... is used to:
a) Export data
b) Add rows from one table to another ✅

c) Modify schema
d) Drop rows

50. DML commands are:
a) Auto-committed
b) Reversible ✅
c) Compiled
d) Encrypted

51. Which command adds multiple records in one go?
a) ADD
b) INSERT ALL ✅
c) COMMIT
d) APPEND

52. UPDATE with missing WHERE clause affects:
a) One row
b) Only NULLs
c) All rows ✅
d) Foreign keys

53. DELETE is faster than TRUNCATE.
❌ False ✅

54. DML is part of:
a) Data Control
b) Data Retrieval
c) Data Processing ✅
d) Data Modeling

55. DELETE is a:
a) DCL
b) TCL
c) DML ✅
d) DDL

56. Can INSERT fail?
a) No
b) Yes, due to constraints ✅
c) Only on unique key
d) Only on empty tables

57. DML statements can be controlled using:
a) GRANT
b) COMMIT and ROLLBACK ✅
c) RENAME
d) FORMAT

58. UPDATE can change:
    a) Table structure
    b) Column names
    c) Column values ✅
    d) Indexes

59. SELECT statements are:
    a) DML ✅
    b) DCL
    c) DDL
    d) TCL

60. SELECT INTO creates:
    a) Temporary copy ✅
    b) Constraint
    c) Schema
    d) New user

61. DML commands impact:
    a) Schema
    b) Permissions
    c) Data ✅
    d) Files

✅ PART C: DCL – Data Control Language

71. Which of the following is a DCL command?
    a) CREATE
    b) GRANT ✅
    c) DELETE
    d) ALTER

72. DCL is used to:
    a) Define schema
    b) Manage transactions
    c) Control access to data ✅
    d) Create indexes

73. Which DCL command is used to **revoke permissions**?
    a) CANCEL
    b) REVOKE ✅
    c) DELETE
    d) ALTER

74. GRANT command is used to:
    a) Add new data
    b) Provide privileges ✅

c) Alter table
d) Insert values

75. REVOKE removes:
a) Constraints
b) Data
c) User access ✅
d) Tables

76. Who can issue GRANT command?
a) Public
b) DBA or owner ✅
c) Foreign key
d) Guest

77. Which of these privileges can be granted?
a) CREATE
b) SELECT
c) DELETE
d) All of the above ✅

78. GRANT SELECT ON table TO user; — This means:
a) User can update data
b) User can read table ✅
c) User owns table
d) User is admin

79. DCL mainly affects:
a) Schema
b) Permissions ✅
c) Structure
d) Memory

80. Can DCL control DML access?
a) No
b) Yes ✅
c) Only for DELETE
d) Only for INSERT

81. Which privilege allows deletion of rows?
a) SELECT
b) DELETE ✅
c) GRANT
d) MODIFY

82. Which DCL command **disables** a previously granted privilege?
→ **REVOKE** ✅

83. To give a user ability to pass rights to others, use:
→ **GRANT ... WITH GRANT OPTION** ✅

84. GRANT command can be used for:
a) Adding constraints
b) Giving query rights ✅
c) Creating backups
d) Schema migration

85. Privileges are stored in:
a) Index
b) User tables
c) System catalog ✅
d) Data pages

86. DCL commands apply at:
a) Application level
b) Schema level
c) Database level ✅
d) File level

87. REVOKE SELECT ON employee FROM user1;
a) Removes SELECT privilege ✅
b) Deletes table
c) Drops database
d) None

88. Which of these are **not** DCL?
a) GRANT
b) REVOKE
c) ALTER ✅
d) None

89. DCL is often executed by:
a) Public
b) Users
c) Admin or DBA ✅
d) Developers

90. What happens after REVOKE?
a) User is deleted
b) Access is revoked ✅
c) Data is deleted
d) Table is dropped

Session 5 & 6: (Functions, Grouping, Set Operators)

✅ PART A: Inbuilt SQL Functions

1. Which of the following is an **aggregate function**?
   a) UPPER
   b) COUNT ✅
   c) TRIM
   d) ROUND

2. Which function returns the **number of rows** in a result set?
   a) SUM
   b) COUNT ✅
   c) LENGTH
   d) MAX

3. The function AVG() is used to:
   a) Count all rows
   b) Find total
   c) Return average value ✅
   d) Group data

4. Which function returns the **highest value**?
   a) MAX ✅
   b) HIGH
   c) GREATEST
   d) BIG

5. What does MIN(Salary) return?
   a) Maximum salary
   b) Count of minimum
   c) Minimum salary ✅
   d) Median

6. LENGTH('Sarang') returns:
   a) 5
   b) 6 ✅
   c) 7
   d) Error

7. Which function **removes spaces** from both ends of a string?
   a) REMOVE
   b) TRIM ✅
   c) STRIP
   d) CUT

8. LOWER('HELLO') gives:
   a) hello ✅
   b) HELLO
   c) Hello
   d) Error

9. Which function converts text to uppercase?
   a) CAPS
   b) UPPER ✅
   c) TO_UPPER
   d) FORMAT

10. Which function returns the **current system date**?
    a) NOW()
    b) GETDATE() ✅
    c) CURRENT
    d) DATE()

11. The ROUND(123.456, 2) returns:
    a) 123.45
    b) 123.46 ✅
    c) 123.44
    d) 124

12. Which function finds the **absolute value**?
    a) CEIL
    b) ABS ✅
    c) POS
    d) SIGN

13. Which returns the **remainder** of division?
    a) MOD ✅
    b) DIV
    c) REM
    d) SPLIT

14. The CONCAT('CDAC', 'Pune') returns:
    a) CDAC Pune
    b) CDACPune ✅
    c) PuneCDAC
    d) Error

15. To extract year from a date:
    a) YEAR(date_column) ✅
    b) GETYEAR
    c) EXTRACTYEAR
    d) PARSE(YEAR)

16. Which function **adds months** to a date?
    a) ADDDATE
    b) ADD_MONTHS ✅
    c) NEWDATE
    d) DATEPLUS

17. SYSDATE function returns:
    a) Current system time ✅
    b) Static date
    c) User-defined date
    d) Next date

18. Which of these is **not an aggregate function**?
    a) COUNT
    b) MAX
    c) SUM
    d) LENGTH ✅

19. What will LENGTH(NULL) return?
    a) 0
    b) NULL ✅
    c) Error
    d) -1

20. Which function replaces characters?
    a) REPLACE ✅
    b) SUBSTR
    c) TRIM
    d) ALTER

21. Which function gives the **first characters of a string**?
    a) MID
    b) SUBSTR ✅
    c) HEAD
    d) FIRST

22. Which of these is a **numeric function**?
    a) SUM ✅
    b) REPLACE
    c) TRIM
    d) UPPER

23. Which of the following **returns a NULL** when NULL is passed?
    a) COUNT(*)
    b) COUNT(column) ✅
    c) MAX
    d) MIN

24. Which function returns current timestamp?
    a) NOW() ✅
    b) TIME()
    c) CURRENT
    d) SYSTEM()

25. NVL(Salary, 0) is used to:
    a) Return NULL
    b) Replace NULL with 0 ✅
    c) Remove 0s
    d) Add NULL

26. What does INSTR('banana', 'a') return?
    a) 2 ✅
    b) 1
    c) 3
    d) 4

27. Which function finds position of a substring?
    a) LOCATE ✅
    b) SEARCH
    c) INDEX
    d) POSITION

28. Which returns the **difference in months between two dates**?
    a) DATE_DIFF
    b) MONTHS_BETWEEN ✅
    c) DATEDIFF
    d) INTERVAL

29. What does CEIL(10.2) return?
    a) 10
    b) 11 ✅
    c) 9
    d) 0

30. FLOOR(10.9) returns:
    a) 10 ✅
    b) 11
    c) 0
    d) 9

31. POWER(2,3) returns:
    a) 6
    b) 8 ✅
    c) 9
    d) Error

32. SIGN(-5) returns:
    a) 0
    b) -1 ✅
    c) 1
    d) 5

33. ROUND(123.999, 0) returns:
    a) 123
    b) 124 ✅
    c) 122
    d) Error

34. What is the output of TRIM(' Hello ')?
    a) Hello ✅
    b) ' Hello '
    c) 'Hello '
    d) ' Hello'

35. SUBSTR('CDAC', 2, 2) returns:
    a) CD
    b) DA ✅
    c) AC
    d) C

36. In SUBSTR('abcdef', 3), result is:
    a) abc
    b) cdef ✅
    c) def
    d) ab

37. REPLACE('banana', 'a', 'o') = ?
    a) bonono ✅
    b) banana
    c) banona
    d) bonana

38. LENGTH('') returns:
    a) 0 ✅
    b) NULL
    c) 1
    d) Error

39. Which function **pads** a string to the right?
    a) RPAD ✅
    b) LPAD
    c) ADDPAD
    d) FILL

40. NVL(NULL, 'default') returns:
    a) default ✅
    b) NULL
    c) 0
    d) ''

✅ PART B: GROUP BY & HAVING Clause

41. GROUP BY is used to:
    a) Filter rows
    b) Sort rows
    c) Group rows based on column ✅
    d) Join rows

42. HAVING is used with:
    a) SELECT
    b) GROUP BY ✅
    c) ORDER BY
    d) WHERE

43. WHERE filters:
    a) Groups
    b) Rows before grouping ✅
    c) Aggregates
    d) Results

44. HAVING filters:
    a) Individual rows
    b) Grouped data ✅
    c) Columns
    d) Joins

45. Which clause comes **after GROUP BY**?
    a) WHERE
    b) ORDER BY ✅
    c) SELECT
    d) JOIN

46. GROUP BY must be used when:
    a) Aggregates are involved ✅
    b) Filtering rows
    c) Selecting specific values
    d) Inserting data

47. Can we use HAVING without GROUP BY?
    a) Yes ✅
    b) No
    c) Only with subqueries
    d) Only in MySQL

48. Which clause is evaluated **first**?
    a) HAVING
    b) GROUP BY
    c) WHERE ✅
    d) SELECT

49. Syntax for using COUNT with GROUP BY:
    → SELECT col, COUNT(*) FROM table GROUP BY col; ✅

50. Can we use alias in HAVING?
    a) Yes ✅
    b) No
    c) Only in subqueries
    d) Only with ORDER BY

51. GROUP BY combines:
    a) Tables
    b) Rows with same value ✅
    c) Columns
    d) Functions

52. Which is invalid use of GROUP BY?
    a) GROUP BY alias
    b) GROUP BY column
    c) GROUP BY aggregate ✅
    d) GROUP BY position

53. SELECT COUNT(*), dept FROM emp GROUP BY dept; shows:
    a) Employees in each dept ✅
    b) All employees
    c) Highest paid employee
    d) List of departments

54. HAVING COUNT(*) > 1 means:
    a) Only groups with >1 row shown ✅
    b) Only unique rows
    c) All groups
    d) Groups with nulls

55. GROUP BY allows aggregation.
    ✅ True

56. HAVING is applied before GROUP BY.
    ❌ False ✅

57. WHERE cannot use aggregate functions.
    ✅ True

58. HAVING can use aggregate functions.
    ✅ True

59. GROUP BY can be used without aggregate.
    ✅ True

60. ORDER BY can be used with GROUP BY.
    ✅ True

✅ PART C: Set Operators

61. Which operator combines results from 2 queries and removes duplicates?
    a) UNION ✅
    b) INTERSECT
    c) JOIN
    d) UNION ALL

62. Which retains duplicates?
    a) UNION
    b) UNION ALL ✅
    c) INTERSECT
    d) MINUS

63. INTERSECT returns:
    a) All rows
    b) Common rows ✅
    c) Only duplicates
    d) Errors

64. MINUS returns:
    a) Common rows
    b) Unique rows from second
    c) Rows in first but not second ✅
    d) Nulls

65. Which operator is **faster**?
    a) UNION
    b) UNION ALL ✅
    c) INTERSECT
    d) JOIN

66. All set operations require:
    a) Same data
    b) Same number of columns ✅
    c) Primary keys
    d) Unique values

67. Which operator is not in SQL?
    a) UNION
    b) INTERSECT
    c) MINUS
    d) EXCEPT (in Oracle) ✅

68. UNION returns:
    a) Rows in either query ✅
    b) Rows in both

c) Subquery results
d) Error

69. INTERSECT is supported in:
a) MySQL
b) Oracle ✅
c) HTML
d) MongoDB

70. MINUS is supported in:
a) Oracle ✅
b) MySQL
c) MongoDB
d) SQLite

71. Which operator gives **symmetric difference**?
a) UNION
b) UNION ALL minus INTERSECT ✅
c) INTERSECT
d) JOIN

72. UNION requires:
a) Equal columns ✅
b) Same table
c) Same keys
d) Same rows

73. In SELECT * FROM A UNION ALL SELECT * FROM B, duplicates are:
a) Removed
b) Retained ✅
c) Grouped
d) Renamed

74. Set operators cannot be used with:
a) WHERE
b) ORDER BY inside subqueries ✅
c) SELECT
d) DISTINCT

75. ORDER BY in UNION queries should be:
a) In both queries
b) In last query ✅
c) At top
d) Not used

76. UNION removes:
a) Keys
b) Duplicates ✅

c) Joins
d) Tables

77. INTERSECT results in:
a) Duplicates
b) NULLs
c) Common values ✅
d) Distinct keys

78. UNION is a:
a) Join
b) Set operator ✅
c) Subquery
d) Constraint

79. Set operations do not support:
a) Sorting
b) NULLs
c) Columns with different names ✅
d) Joins

80. UNION and INTERSECT are:
a) DML
b) DDL
c) Set operations ✅
d) Constraints

Session - 7

LIKE, DISTINCT, ORDER BY

1. What does the LIKE operator do?
a) Filters exact values
b) Matches patterns using wildcards ✅
c) Joins two tables
d) Orders records

2. Which wildcard is used in SQL for a **single character** match?
a) %
b) *
c) _ ✅
d) ?

3. Which wildcard is used to match **any sequence of characters**?
a) _
b) % ✅
c) #
d) *

4. SELECT * FROM emp WHERE name LIKE 'A%' returns:
   a) Names ending with A
   b) Names starting with A ✅
   c) Names containing A
   d) Only name = A

5. What does LIKE '_a%' mean?
   a) Begins with a
   b) 2nd letter is 'a' ✅
   c) Ends with a
   d) Contains 'a' anywhere

6. DISTINCT keyword is used to:
   a) Sort results
   b) Eliminate duplicates ✅
   c) Join tables
   d) Group records

7. SELECT DISTINCT dept FROM emp; returns:
   a) All rows
   b) Rows without NULL
   c) Unique departments ✅
   d) Count of depts

8. Which of the following **removes duplicate rows** in a query result?
   a) WHERE
   b) HAVING
   c) DISTINCT ✅
   d) UNIQUE

9. ORDER BY is used to:
   a) Group rows
   b) Filter rows
   c) Sort rows ✅
   d) Join tables

10. ORDER BY salary DESC will:
    a) Show salary in ascending
    b) Show salary in descending ✅
    c) Random order
    d) Error

11. By default, ORDER BY sorts in:
    a) Descending
    b) Random
    c) Ascending ✅
    d) Alphabetical

12. To sort by multiple columns, you use:
    a) ORDER salary name
    b) ORDER BY salary AND name
    c) ORDER BY salary, name ✅
    d) SORT salary name

BETWEEN, AND, OR

13. The BETWEEN operator checks for:
    a) Exact match
    b) Range inclusion ✅
    c) Pattern match
    d) Join condition

14. SELECT * FROM emp WHERE salary BETWEEN 30000 AND 50000 returns:
    a) Salaries > 50000
    b) Salaries < 30000
    c) Salaries between and including 30000 & 50000 ✅
    d) None

15. BETWEEN is inclusive or exclusive?
    → **Inclusive** ✅

16. The AND operator is used to:
    a) Add rows
    b) Join tables
    c) Combine conditions where both must be true ✅
    d) Compare strings

17. The OR operator results in TRUE if:
    a) All conditions are false
    b) At least one condition is true ✅
    c) None match
    d) All must match

18. Which of the following is **true** for AND?
    a) Returns true if either is true
    b) Returns false if both are true
    c) Returns true only if both are true ✅
    d) Always true

19. Expression: salary > 30000 AND dept = 'HR' filters:
    a) Salary < 30k
    b) HR only
    c) Both salary and department match ✅
    d) None

20. WHERE age >= 18 OR city = 'Mumbai' includes:
    a) Only age > 18
    b) Only Mumbai residents
    c) Either of the two ✅
    d) Only both

IS NULL / IS NOT NULL

21. IS NULL is used to:
    a) Check for blank string
    b) Check for unknown value ✅
    c) Check for zero
    d) Compare

22. Which is correct to check if address is not given?
    a) WHERE address = NULL
    b) WHERE address != NULL
    c) WHERE address IS NULL ✅
    d) WHERE address = 'NULL'

23. NULL means:
    a) 0
    b) Empty string
    c) Unknown or missing value ✅
    d) Error

24. What does IS NOT NULL do?
    a) Returns rows with NULL
    b) Returns rows without NULL ✅
    c) Removes all NULLs
    d) Replaces NULL with 0

25. Which of these is invalid for NULL checks?
    a) IS NULL
    b) IS NOT NULL
    c) = NULL ✅
    d) ISNULL()

26. Which is used to check multiple NULL values in a table?
    a) IN NULL
    b) HAVING NULL
    c) WHERE col IS NULL ✅
    d) WHERE col = NULL

IN / NOT IN Operators

27. The IN operator is used to:
    a) Join tables
    b) Match a value against a list ✅
    c) Remove duplicates
    d) Create views

28. WHERE city IN ('Mumbai', 'Pune') returns:
    a) All rows
    b) Rows only from Mumbai
    c) Rows from Mumbai or Pune ✅
    d) No rows

29. IN clause is a shortcut for:
    a) LIKE
    b) OR ✅
    c) NOT
    d) JOIN

30. NOT IN excludes:
    a) NULLs
    b) The listed values ✅
    c) All values
    d) Duplicates

31. WHERE dept IN ('HR', 'Admin') is same as:
    a) dept = 'HR'
    b) dept = 'HR' AND dept = 'Admin'
    c) dept = 'HR' OR dept = 'Admin' ✅
    d) dept != 'Sales'

32. Which is true about IN clause?
    a) Slower than multiple ORs
    b) Matches a value from a list ✅
    c) Used in DDL
    d) Invalid in MySQL

Combined Conceptuals

33. SELECT * FROM emp WHERE city NOT IN ('Delhi', 'Pune') means:
    a) Include Delhi & Pune
    b) Exclude Delhi & Pune ✅
    c) Only Delhi
    d) Only Pune

34. The query: SELECT DISTINCT city FROM emp ORDER BY city DESC returns:
    a) Duplicate cities
    b) Random order

c) Sorted, unique cities ✅
d) All cities

35. Which is correct syntax?
a) WHERE age BETWEEN 20 OR 30
b) WHERE age BETWEEN (20,30)
c) WHERE age BETWEEN 20 AND 30 ✅
d) WHERE age = BETWEEN 20 AND 30

36. SELECT name FROM emp WHERE name LIKE '%a' returns names:
a) Starting with a
b) Containing a
c) Ending with a ✅
d) Only equal to a

37. SELECT * FROM emp WHERE name IS NULL OR city = 'Mumbai' means:
a) Only NULL names
b) Only Mumbai
c) Either NULL names or city = Mumbai ✅
d) Both must match

38. WHERE age NOT BETWEEN 25 AND 40 includes:
a) Only ages 25-40
b) Ages less than 25 or greater than 40 ✅
c) 25 and 40 only
d) NULLs

39. What is the result of SELECT COUNT(DISTINCT dept)?
a) Total rows
b) Duplicate rows
c) Unique department count ✅
d) Error

40. WHERE salary IS NULL AND city IN ('Pune', 'Delhi') filters:
a) All cities
b) Cities not Pune or Delhi
c) Rows with NULL salary and Pune/Delhi ✅
d) Only NULL cities

Part B: Relational Algebra

SECTION 1: Basics of Relational Algebra

1. Relational algebra is:
a) A procedural query language ✅
b) A non-procedural query language
c) A high-level language
d) Not related to SQL

2. The result of a relational algebra operation is always:
   a) A number
   b) A string
   c) A relation (table) ✅
   d) A set of indexes

3. Which of the following is a **fundamental operation** in relational algebra?
   a) JOIN
   b) INTERSECT
   c) SELECTION ✅
   d) GROUP BY

4. Relational algebra operations are:
   a) Set-based ✅
   b) Tuple-based
   c) Recursive
   d) Sequential

5. Which symbol represents **selection**?
   a) π
   b) σ ✅
   c) ∪
   d) −

6. Which symbol represents **projection**?
   a) π ✅
   b) σ
   c) ∪
   d) ×

7. Which of the following is not a set operation in relational algebra?
   a) UNION
   b) INTERSECT
   c) SELECTION ✅
   d) DIFFERENCE

8. What does the term “arity” mean in relational algebra?
   a) Number of rows
   b) Number of columns ✅
   c) Size of relation
   d) Number of tuples

9. What is a **relation** in relational algebra?
   a) A record
   b) A function
   c) A table ✅
   d) A field

10. Relational algebra forms the **theoretical base** for:
    a) HTML
    b) SQL ✅
    c) JSON
    d) C++

SECTION 2: Selection (σ)

11. Selection operation is used to:
    a) Choose columns
    b) Filter rows ✅
    c) Sort data
    d) Combine relations

12. Symbol used for selection:
    → **σ** ✅

13. σ(condition)(R) means:
    a) Select columns
    b) Select rows satisfying condition ✅
    c) Group rows
    d) Join tables

14. Which is a valid selection example?
    a) σ Salary > 50000 (Employee) ✅
    b) π Salary > 50000 (Employee)
    c) ∪ Salary (Employee)
    d) × Salary

15. Result of selection operation:
    a) Subset of rows ✅
    b) Subset of columns
    c) Joins
    d) Cartesian product

16. σ Dept = 'HR' (Employee) returns:
    a) All columns from HR dept ✅
    b) Only dept column
    c) Only HR employees' names
    d) Grouped data

17. Selection is a:
    a) Unary operation ✅
    b) Binary operation
    c) Ternary
    d) Composite

18. Can selection use AND / OR in condition?
    → **Yes** ✅

19. Which is incorrect for selection?
    a) σ Age > 30 (Person)
    b) σ Name LIKE ‘S%’ (Person)
    c) σ Person (Age > 30) ✅
    d) σ Age = 25 (Student)

20. Selection cannot:
    a) Remove rows
    b) Filter rows
    c) Change column order ✅
    d) Be combined

SECTION 3: Projection (π)

21. Projection retrieves:
    a) Rows
    b) Specific columns ✅
    c) Indexes
    d) Keys

22. π(Salary, Dept)(Employee) returns:
    a) All rows
    b) Only Salary and Dept columns ✅
    c) All columns
    d) Only unique rows

23. Projection is a:
    a) Unary operation ✅
    b) Binary
    c) Set operation
    d) Function

24. Projection removes:
    a) Duplicate columns
    b) Duplicate tuples ✅
    c) NULLs
    d) Indexes

25. π(Dept, Salary)(Employee) removes:
    a) Columns
    b) Duplicates ✅
    c) Keys
    d) All rows

26. Projection operation helps in:
    a) Filtering rows
    b) Filtering columns ✅
    c) Updating schema
    d) Creating triggers

27. Can projection be applied on multiple attributes?
    → **Yes** ✅

28. π(*) in relational algebra means:
    a) All columns ✅
    b) All rows
    c) No selection
    d) Aggregation

29. Which is an invalid projection?
    a) π Name, Age (Student)
    b) π Salary(Employee)
    c) π (Student, Marks)
    d) π Student (Marks) ✅

30. Projection on empty table gives:
    a) Error
    b) Empty relation ✅
    c) NULL
    d) Zero

SECTION 4: Set Operations – Union, Intersect, Minus

31. Which symbol represents **union**?
    a) ∪ ✅
    b) ∩
    c) −
    d) σ

32. The result of R ∪ S includes:
    a) All records from R and S ✅
    b) Only common
    c) Only R
    d) Only S

33. Which symbol is used for **intersection**?
    a) ∪
    b) ∩ ✅
    c) −
    d) ⊕

34. R ∩ S returns:
    a) All records from both
    b) Records present in both ✅
    c) All records from R
    d) All except NULLs

35. The symbol for **set difference** is:
    a) ⊗
    b) ∩
    c) − ✅
    d) ÷

36. R − S gives:
    a) Only records in S
    b) Records in R not in S ✅
    c) Intersection
    d) Projection

37. For set operations to work, two relations must have:
    a) Same name
    b) Same attributes and data types ✅
    c) Same keys
    d) Same number of rows

38. Which of the following is **not** a set operation?
    a) UNION
    b) DIFFERENCE
    c) INTERSECT
    d) JOIN ✅

39. Union removes:
    a) Duplicates ✅
    b) NULLs
    c) Columns
    d) Rows

40. Which one retains only distinct tuples?
    a) UNION ✅
    b) UNION ALL
    c) CROSS JOIN
    d) OUTER JOIN

41. The operation R ∪ R returns:
    a) Empty
    b) R ✅
    c) NULL
    d) Error

42. What is required for intersection?
   a) Same number of rows
   b) Same schema ✅
   c) Foreign key
   d) Index

43. $R \cap \emptyset$ results in:
   a) $\emptyset$ ✅
   b) R
   c) NULL
   d) Error

44. $R - \emptyset$ gives:
   a) $\emptyset$
   b) R ✅
   c) NULL
   d) ERROR

45. $\emptyset - R = ?$
   a) $\emptyset$ ✅
   b) R
   c) NULL
   d) ERROR

46. The result of $(R \cup S) - T$ is:
   a) Common in R, S and T
   b) R and S but not in T ✅
   c) Only T
   d) S and T

47. The associative law holds true for:
   a) SELECTION
   b) PROJECTION
   c) UNION ✅
   d) DIVISION

48. Which law: $R \cup (S \cup T) = (R \cup S) \cup T$
   → Associative Law ✅

49. Which is distributive:
   a) $\sigma(\text{condition})(R \cup S) = \sigma(\text{condition})(R) \cup \sigma(\text{condition})(S)$ ✅
   b) $\pi(R \cup S) = \pi(R) \cap \pi(S)$
   c) $\sigma(R) - \sigma(S) = \emptyset$
   d) None

50. Which of the following is **commutative**?
   a) $R \cup S$ ✅
   b) $R - S$

c) $R \div S$
d) JOIN with ON

51. Which of the following is **not commutative**?
a) UNION
b) INTERSECT
c) DIFFERENCE ✅
d) SELECTION

52. Which operation is **symmetric**?
a) $R \cup S$
b) $R \cap S$
c) $(R - S) \cup (S - R)$ ✅
d) $R - S$

53. INTERSECT returns:
a) NULLs
b) Common rows ✅
c) Only R
d) All

54. Union compatible relations must have:
a) Same size
b) Same number of attributes ✅
c) Same indexes
d) Keys

55. If R and S are disjoint, $R \cap S$ = ?
a) R
b) S
c) $\varnothing$ ✅
d) NULL

56. Difference operator output is:
a) Union
b) Subset ✅
c) Projection
d) Cartesian

57. Selection and projection can be combined as:
a) π Salary (σ Dept = 'IT' (Employee)) ✅
b) σ π(Employee)
c) π (Employee) σ
d) σ(π(Employee))

58. $R \cap (R - S)$ = ?
a) R
b) S

c) R − S ✅
d) ∅

59. R − (R ∩ S) = ?
a) R ∪ S
b) R − S ✅
c) S − R
d) ∅

60. R ∩ (S − T) = ?
a) Common in R and S but not in T ✅
b) All
c) S only
d) NULL

Session 8 & 9 – Part A: SQL & Aggregate Functions

SQL Functions Overview

1. Which of the following is a **single-row function** in SQL?
a) COUNT
b) SUM
c) UPPER ✅
d) AVG

2. SQL functions can be classified into:
a) System and User-defined
b) Scalar and Aggregate ✅
c) Static and Dynamic
d) Constant and Variable

3. Which function is used to convert text to uppercase?
a) TOCHAR
b) LOWER
c) UPPER ✅
d) CONCAT

4. What does the LENGTH() function return?
a) Number of words
b) Number of characters ✅
c) Data type
d) Byte size

5. CONCAT('CDAC', 'CCE') gives:
a) CDAC
b) CCE

c) CDAC CCE
d) CDACCCE ✅

6. SUBSTR('DATABASE', 5, 3) returns:
   a) DATA
   b) BASE
   c) ABA ✅
   d) TAB
7. Which function returns the current system date?
   a) GETDATE ✅
   b) SYSDATE
   c) NOW()
   d) CURRENT_DATE
8. What is the output of ROUND(25.678, 1)?
   a) 25.67
   b) 25.6
   c) 25.7 ✅
   d) 25
9. The TRIM() function is used to:
   a) Remove rows
   b) Convert text
   c) Remove leading/trailing spaces ✅
   d) Round numbers
10. Which function finds the position of a character in a string?
   a) POSITION ✅
   b) LOCATE
   c) INDEX
   d) CHARPOS

Aggregate Functions

11. Which of these is **not** an aggregate function?
   a) COUNT
   b) MAX
   c) LENGTH ✅
   d) SUM
12. COUNT(*) counts:
   a) Only non-null values
   b) Only primary keys
   c) All rows ✅
   d) Only numbers

13. AVG() is used to calculate:
    a) Total sum
    b) Mean value ✅
    c) Count of rows
    d) Maximum

14. What does MIN() return?
    a) Minimum of numbers ✅
    b) Row with least characters
    c) Number of rows
    d) 0

15. What is the result of MAX(SALARY)?
    a) Smallest salary
    b) Total salary
    c) Largest salary ✅
    d) Null

16. Which of the following returns total of a numeric column?
    a) SUM ✅
    b) TOTAL
    c) ADD
    d) COUNT

17. COUNT(column_name) excludes:
    a) Zero
    b) Duplicates
    c) NULLs ✅
    d) Strings

18. Which returns only non-duplicate counts?
    a) COUNT(*)
    b) COUNT(ALL)
    c) COUNT(DISTINCT col) ✅
    d) COUNT(NULL)

19. You can use aggregate functions in:
    a) SELECT ✅
    b) WHERE
    c) ORDER BY
    d) CREATE

20. SELECT SUM(price) FROM products returns:
    a) Row count
    b) NULLs
    c) Total price ✅
    d) Average price

Advanced Use and Behavior

21. What is returned by COUNT(NULL)?
    a) 1
    b) 0 ✅
    c) NULL
    d) Error

22. Aggregate functions **ignore NULLs** by default?
    a) No
    b) Yes ✅
    c) Only SUM
    d) Only COUNT

23. Can we use more than one aggregate function in a single query?
    a) No
    b) Yes ✅
    c) Only SUM and COUNT
    d) Only when grouped

24. Which query finds average salary in EMPLOYEES table?
    a) SELECT AVG(SALARY) FROM EMPLOYEES; ✅
    b) SELECT AVERAGE(SALARY)
    c) SELECT SUM(SALARY)/COUNT(SALARY)
    d) SELECT MIN(SALARY)

25. If a column has only NULLs, AVG(col) returns:
    a) 0
    b) NULL ✅
    c) 1
    d) Error

26. Aggregate functions can be used with:
    a) INSERT
    b) DELETE
    c) SELECT ✅
    d) UPDATE

27. Can aggregate functions be used without GROUP BY?
    → Yes ✅

28. Aggregate functions apply to:
    a) Rows ✅
    b) Columns only
    c) Joins
    d) Triggers

29. What will MAX('Apple', 'Banana') return in SQL?
    a) Apple

b) Banana ✅ (Lexicographically higher)
c) NULL
d) Error

30. Can SUM() be used on string values?
a) Yes
b) No ✅
c) Only if CAST
d) Only with CHAR(10)

Use with DISTINCT, WHERE, and Formatting

31. What does SUM(DISTINCT Salary) do?
a) Sums duplicates
b) Sums only unique salaries ✅
c) Ignores NULL
d) Errors

32. Which of the following is valid?
a) WHERE SUM(SALARY) > 50000
b) SELECT SUM(SALARY) WHERE DEPT = 'HR'
c) SELECT SUM(SALARY) FROM EMP WHERE DEPT = 'HR'; ✅
d) None

33. Which of the following returns number of departments?
a) COUNT(*)
b) COUNT(ALL dept)
c) COUNT(DISTINCT dept) ✅
d) SUM(dept)

34. Can aggregate functions be used in ORDER BY clause?
a) Yes ✅
b) No
c) Only COUNT
d) Only on text

35. What is the use of ROUND(SUM(price), 2)?
a) Rounds individual rows
b) Rounds total price to 2 decimal places ✅
c) Removes NULL
d) Trims string

36. Aggregate functions always return:
a) Single value ✅
b) Multiple rows
c) Table
d) String

37. Which clause is used **with** aggregate functions for grouping?
    a) ORDER BY
    b) HAVING
    c) GROUP BY ✅
    d) JOIN

38. Can aggregate functions be nested?
    a) No
    b) Yes ✅
    c) Only COUNT
    d) Only in subqueries

39. SELECT SUM(salary) + COUNT(salary) is:
    a) Invalid
    b) Valid ✅
    c) Returns string
    d) Returns NULL

40. SELECT COUNT(*) FROM emp WHERE dept IS NULL returns:
    a) Employees with NULL dept ✅
    b) Total emp
    c) NULL
    d) Error

Part B: GROUP BY and HAVING Clause

GROUP BY Clause Basics

1. GROUP BY is used to:
   a) Filter rows
   b) Combine columns
   c) Group rows based on a column ✅
   d) Sort output

2. Which clause must be used **with** GROUP BY for filtering groups?
   a) WHERE
   b) ORDER BY
   c) HAVING ✅
   d) DISTINCT

3. What does the query do?
   SELECT dept, COUNT(*) FROM emp GROUP BY dept;
   a) Lists all employees
   b) Lists all departments
   c) Shows number of employees in each department ✅
   d) Shows average salary

4. You can use GROUP BY with:
   a) DDL

b) DML
c) SELECT ✅
d) ALTER

5. GROUP BY always comes:
a) Before WHERE
b) After ORDER BY
c) After WHERE and before HAVING ✅
d) First in query

6. GROUP BY must contain:
a) Only aggregate columns
b) All non-aggregated selected columns ✅
c) Only keys
d) Only WHERE clause

7. Which is correct?
a) SELECT name, COUNT(*) FROM emp GROUP BY dept;*
*b) SELECT dept, COUNT(*) FROM emp GROUP BY dept; ✅
c) SELECT COUNT(*) GROUP BY dept FROM emp;
d) GROUP BY emp SELECT dept;

8. GROUP BY can be used with:
a) INSERT
b) DELETE
c) SELECT ✅
d) CREATE

9. Can we use multiple columns in GROUP BY?
→ **Yes** ✅

10. GROUP BY dept, role means:
a) Group by either
b) Group by dept then role ✅
c) Group by dept only
d) Group by sum

11. GROUP BY groups:
a) Rows ✅
b) Columns
c) Tables
d) Keys

12. Grouping without aggregate function is:
a) Useless
b) Invalid ✅
c) Allowed
d) Same as SELECT

13. GROUP BY output returns:
    a) One row
    b) Summary per group ✅
    c) All rows
    d) Nulls only

14. GROUP BY always works on:
    a) Keys
    b) Aggregate functions ✅
    c) Strings
    d) Triggers

15. GROUP BY is valid in which clause?
    a) HAVING
    b) WHERE
    c) SELECT ✅
    d) INSERT

16. A column in SELECT without aggregate must be:
    a) In HAVING
    b) In ORDER BY
    c) In GROUP BY ✅
    d) In WHERE

17. SELECT dept FROM emp GROUP BY dept shows:
    a) Distinct dept ✅
    b) Duplicates
    c) Count
    d) Dept names only

18. Can GROUP BY be used without WHERE clause?
    → **Yes** ✅

19. Can we use GROUP BY on expressions?
    a) No
    b) Yes ✅
    c) Only on columns
    d) Only strings

20. GROUP BY can group:
    a) All columns
    b) Any selected column ✅
    c) Only numeric
    d) None

HAVING Clause

21. HAVING clause filters:
    a) Before GROUP BY
    b) After WHERE
    c) After GROUP BY ✅
    d) In ORDER BY

22. HAVING can be used **without** GROUP BY?
    a) No
    b) Yes ✅

23. HAVING vs WHERE – which works on aggregated data?
    → HAVING ✅

24. Example:
    SELECT dept, COUNT(*) FROM emp GROUP BY dept HAVING COUNT(*) > 2;
    What does it return?
    a) Departments with any count
    b) Depts with >2 employees ✅
    c) All depts
    d) None

25. WHERE filters rows, HAVING filters:
    a) Columns
    b) Aggregated groups ✅
    c) Tables
    d) NULLs

26. Which is correct order?
    a) SELECT > HAVING > GROUP BY
    b) GROUP BY > SELECT > HAVING
    c) SELECT > FROM > WHERE > GROUP BY > HAVING ✅
    d) HAVING > WHERE

27. Can HAVING use aggregate functions?
    → Yes ✅

28. HAVING can be used with COUNT, AVG, SUM etc?
    → Yes ✅

29. Can you use HAVING without WHERE?
    → Yes ✅

30. HAVING filters data **after** aggregation?
    → Yes ✅

31. Which is valid HAVING clause?
    a) HAVING salary = NULL
    b) HAVING COUNT(salary) > 5 ✅
    c) HAVING name
    d) HAVING ORDER BY

32. You cannot use HAVING to filter:
    a) Groups
    b) Aggregates
    c) Individual rows ✅
    d) Multiple columns

33. Can HAVING include logical operators like AND, OR?
    → Yes ✅

34. Is this valid?
    HAVING AVG(salary) >= 30000 AND COUNT(*) < 5
    → Yes ✅

35. Which returns only departments with >10 staff and salary > 25K?
    a) WHERE salary > 25000 AND COUNT*() > 10*
    b) HAVING salary > 25000
    c) GROUP BY dept HAVING COUNT() > 10 AND AVG(salary) > 25000 ✅
    d) None

36. HAVING can be used with:
    a) INSERT
    b) DELETE
    c) SELECT ✅
    d) UPDATE

37. You can combine WHERE and HAVING in same query?
    → Yes ✅

38. HAVING can filter on:
    a) Non-aggregated data
    b) Aggregated data ✅
    c) All rows
    d) SELECTed columns only

39. Can we use GROUP BY and HAVING without SELECT?
    a) No ✅
    b) Yes

40. HAVING cannot be used to:
    a) Filter grouped data
    b) Use COUNT
    c) Replace WHERE ✅
    d) Apply AND

Advanced Combinations and Use-Cases

41. Which returns highest total salary per dept?
    a) SELECT MAX(salary) GROUP BY dept

b) SELECT dept, MAX(salary) FROM emp GROUP BY dept ✅
c) SELECT MAX(dept), salary
d) SELECT salary FROM emp

42. What's wrong with:
SELECT name, COUNT(*) FROM emp GROUP BY dept
a) Missing HAVING
b) name is not grouped or aggregated ✅
c) Wrong function
d) Nothing

43. HAVING COUNT(*) > 1 filters:
a) Unique records
b) Groups with more than 1 row ✅
c) NULL rows
d) Joins

44. Can we group by result of expression like YEAR(date)?
→ Yes ✅

45. GROUP BY 1 means:
a) Group by column index 1 ✅
b) Group by value 1
c) Error
d) Constant grouping

46. What is the purpose of GROUP BY with HAVING COUNT(*) = 1?
a) Filter groups with duplicates
b) Select unique entries ✅
c) Count NULLs
d) None

47. GROUP BY col1 HAVING col2 > 5 is:
a) Valid only if col2 is aggregated ✅
b) Always valid
c) Invalid
d) None

48. Which returns count of employees per city?
a) SELECT city FROM emp
b) SELECT city, COUNT(*) FROM emp GROUP BY city ✅
c) GROUP BY city
d) COUNT(emp)

49. Which returns average marks for students scoring > 50?
a) WHERE marks > 50 AVG(marks)
b) SELECT AVG(marks) FROM students WHERE marks > 50 ✅
c) GROUP BY marks HAVING > 50
d) HAVING marks > 50

50. Which is equivalent to:
SELECT dept, SUM(salary) FROM emp GROUP BY dept HAVING SUM(salary) > 50000
a) GROUP BY salary
b) WHERE SUM(salary) > 50000
c) Filter departments with total salary > 50k ✅
d) Count NULLs

51. Can GROUP BY be used without aggregate?
→ No ✅

52. Can HAVING be used to restrict rows before grouping?
→ No ✅

53. GROUP BY with ORDER BY helps in:
a) Filtering
b) Sorting grouped output ✅
c) Joining
d) Removing duplicates

54. GROUP BY on multiple columns groups by:
a) Either
b) Both in order ✅
c) Primary key
d) Aggregates

55. GROUP BY city ORDER BY COUNT(*) DESC is valid?
→ Yes ✅

56. HAVING MAX(salary) > 60000 filters:
a) Before grouping
b) Groups with max salary over 60K ✅
c) All rows
d) Error

57. Which clause runs first?
a) SELECT
b) HAVING
c) WHERE ✅
d) ORDER BY

58. HAVING SUM(price) BETWEEN 500 AND 1000 is:
a) Invalid
b) Valid ✅
c) Syntax error
d) None

59. Can HAVING use aliases from SELECT?
a) Yes
b) No ✅

60. What’s the output of this?

sql

CopyEdit

```
SELECT category, COUNT(*)

FROM products

GROUP BY category

HAVING COUNT(*) >= 5;
```

a) Products list
b) Categories with at least 5 products ✅
c) Prices
d) Null

Session 10 & 11: Subqueries, Joins & Subquery Joins

Part A: Subqueries

---

1. A subquery is:
   a) A query inside a table
   b) A query inside a function
   c) A query inside another query ✅
   d) A function inside a query

2. A subquery is also known as:
   a) Nested query ✅
   b) Multiple query
   c) Joins query
   d) Foreign query

3. Subqueries are enclosed in:
   a) Braces
   b) Square brackets

c) Parentheses ✅
d) Quotes

4. Subqueries can be used in:
a) SELECT
b) FROM
c) WHERE
d) All of the above ✅

5. Which of the following is NOT a type of subquery?
a) Scalar
b) Multi-row
c) Aggregate
d) Temporary ✅

6. A scalar subquery returns:
a) Many rows
b) Only one column
c) Only one row and one column ✅
d) No result

7. Which clause commonly uses subqueries?
a) WHERE ✅
b) ORDER
c) UPDATE
d) INSERT

8. What is true about correlated subqueries?
a) They run independently
b) They reference outer query ✅
c) They always return one row
d) They cannot be nested

9. Subqueries cannot be used in:
a) WHERE
b) HAVING
c) ORDER BY
d) None ✅

10. Which operator is used with subqueries returning multiple rows?
a) =
b) >
c) IN ✅
d) BETWEEN

11. Which keyword is used to test for existence in a subquery?
a) EXISTS ✅
b) HAVING

c) IN
d) JOIN

12. Subqueries can be used in:
a) DELETE
b) INSERT
c) SELECT
d) All ✅

13. A subquery that refers to the outer query is:
a) Inline
b) Nested
c) Correlated ✅
d) Joined

14. Subquery used in FROM clause is called:
a) Table alias
b) Inline view ✅
c) Derived table
d) Cartesian view

15. The result of a subquery can be compared using:
a) =
b) >
c) IN
d) All ✅

16. What will happen if subquery returns multiple rows in a scalar context?
a) Success
b) Error ✅
c) Warning
d) Partial result

17. A correlated subquery:
a) Executes once
b) Executes multiple times ✅
c) Runs independently
d) Is not valid

18. What is required for correlated subqueries?
a) Primary key
b) Column from outer query ✅
c) Joins
d) Views

19. Which clause does not accept subquery?
a) FROM
b) ORDER BY

c) VALUES
d) All accept ✔

20. Which of these operators are often used with subqueries?
a) IN
b) ANY
c) EXISTS
d) All ✔

21. Subquery in SELECT clause is usually:
a) Scalar ✔
b) Aggregate
c) Temporary
d) Correlated

22. Can subqueries be nested more than 1 level?
a) Yes ✔
b) No
c) Only 1 level
d) Only if JOIN used

23. In correlated subquery:
a) Inner query executes once
b) Outer query uses inner result
c) Inner query depends on outer ✔
d) Both are independent

24. A subquery returning a single value is:
a) Scalar ✔
b) Tuple
c) Row
d) Boolean

25. Which returns TRUE if subquery returns rows?
a) IN
b) ANY
c) EXISTS ✔
d) ALL

26. What does NOT EXISTS mean?
a) At least one match
b) No rows returned ✔
c) Joins tables
d) Partial match

27. What does ALL do in a subquery comparison?
a) Compares with one
b) Compares with all ✔

c) Counts all
d) Ignores NULL

28. Can subquery be used in an UPDATE?
→ Yes ✅

29. What will > ANY (SELECT score FROM test) return?
a) Value > max
b) Value > any one ✅
c) Value < any
d) Value = one

30. What does > ALL mean in subquery?
a) Greater than max ✅
b) Less than all
c) Less than min
d) Equal to max

31. Which clause is best for filtering based on subquery?
a) FROM
b) WHERE ✅
c) ORDER
d) JOIN

32. Which type of subquery is faster?
a) Correlated
b) Non-correlated ✅
c) Nested
d) Inline

33. A subquery in INSERT is used to:
a) Filter
b) Insert result of SELECT ✅
c) Remove rows
d) None

34. Subquery in DELETE statement is used to:
a) Add data
b) Return values
c) Remove conditionally ✅
d) Create schema

35. A SELECT subquery must return:
a) Table
b) Record
c) Value ✅
d) Column name

36. Which query uses subquery correctly?
    a) SELECT * FROM emp WHERE salary = SELECT MAX(salary) FROM emp;
    b) SELECT * FROM emp WHERE salary = (SELECT MAX(salary) FROM emp); ✅
    c) SELECT MAX FROM emp;
    d) SELECT WHERE MAX(salary)

37. Can subquery return NULL?
    → Yes ✅

38. What happens if subquery returns NULL?
    a) TRUE
    b) FALSE
    c) UNKNOWN ✅
    d) ERROR

39. Subquery with aggregation returns:
    a) Multiple rows
    b) Table
    c) Single value ✅
    d) Join

40. Subquery syntax error is most likely due to:
    a) Brackets ✅
    b) Column
    c) Table
    d) NULL

Part B: Joins & Subquery Joins

Types of Joins

41. A JOIN clause is used to:
    a) Separate tables
    b) Combine rows from two or more tables ✅
    c) Create tables
    d) Truncate tables

42. A JOIN based on equality condition is:
    a) Cross join
    b) Natural join
    c) Equi Join ✅
    d) Self Join

43. INNER JOIN returns:
    a) All rows
    b) Only matched rows ✅

c) All from left table
d) Unmatched rows only

44. OUTER JOIN returns:
a) Only matched
b) Matched and unmatched ✅
c) Only unmatched
d) Nothing

45. LEFT OUTER JOIN returns:
a) All from right
b) Only matches
c) All from left ✅
d) Both unmatched

46. RIGHT OUTER JOIN returns:
a) All from right ✅
b) All from left
c) Only matched
d) Full result

47. FULL OUTER JOIN returns:
a) Matched rows
b) Unmatched rows
c) All rows from both ✅
d) Duplicates

48. NATURAL JOIN uses:
a) Explicit condition
b) Common column names ✅
c) PK only
d) Foreign key only

49. CROSS JOIN produces:
a) Only common rows
b) Cartesian product ✅
c) Left rows
d) Joined nulls

50. Which join may return more rows than both tables?
a) INNER
b) CROSS ✅
c) LEFT
d) RIGHT

51. Which JOIN shows NULLs from unmatched right rows?
a) LEFT
b) RIGHT ✅

c) INNER
d) NATURAL

52. Which JOIN includes all from left and matching right?
→ LEFT JOIN ✅

53. Self JOIN is:
a) JOIN on same table ✅
b) Cross join
c) Between 3 tables
d) Illegal

54. JOIN is generally performed using:
a) SELECT ✅
b) INSERT
c) DELETE
d) UPDATE

55. To join 3 tables, we use:
a) 1 JOIN
b) 2 JOINs ✅
c) 3 JOINs
d) Subquery

56. Which is correct syntax for INNER JOIN?
a) SELECT * FROM A JOIN B;
b) SELECT * FROM A, B;
c) SELECT * FROM A INNER JOIN B ON A.id = B.id; ✅
d) SELECT JOIN

57. NATURAL JOIN works only if:
a) Same datatype
b) Same column names ✅
c) All rows match
d) One row

58. FULL JOIN returns NULLs when:
a) Rows match
b) No match exists ✅
c) Always
d) None

59. Equi join is:
a) Same as INNER JOIN ✅
b) Same as OUTER
c) NOT a JOIN
d) CROSS JOIN

60. CROSS JOIN is same as:
a) INNER
b) FULL
c) Cartesian ✅
d) NATURAL

61. Subquery JOIN means:
a) JOIN inside subquery ✅
b) Subquery without SELECT
c) CROSS join
d) INSERT

62. A subquery in JOIN helps when:
a) You need filtered table ✅
b) JOIN fails
c) SELECT fails
d) DELETE

63. Subquery JOIN is useful when:
a) Need aggregation ✅
b) Need group only
c) Column rename
d) To remove JOIN

64. Can JOINs be nested inside subqueries?
→ Yes ✅

65. Can we JOIN result of a subquery with another table?
→ Yes ✅

66. Which is true about JOIN vs Subquery:
a) JOINs are faster ✅
b) Subqueries always better
c) Both same
d) JOINs can't filter

67. JOIN vs Subquery—Subquery is preferred when:
a) Simpler filtering ✅
b) Need all rows
c) Memory issue
d) None

68. What is true about performance?
a) JOINs always fast ✅
b) Subqueries always fast
c) Subqueries avoid duplicates
d) JOINs can't use indexes

69. What does USING clause do in JOIN?
a) Specify join condition with same column name ✅
b) Filter rows
c) Create alias
d) Sort output

70. Can JOINs be used without ON?
a) Yes with NATURAL ✅
b) Never
c) Only with WHERE
d) None

71. Join that requires matching key:
a) INNER ✅
b) FULL
c) LEFT
d) NATURAL

72. CROSS JOIN with WHERE makes it:
a) INNER JOIN ✅
b) SELF JOIN
c) NATURAL JOIN
d) FULL JOIN

73. To compare JOIN and Subquery performance:
a) Check plan ✅
b) Count rows
c) Sort output
d) Use WHERE

74. Subquery in JOIN must return:
a) Only 1 row
b) Table ✅
c) NULL
d) Column

75. JOINs help:
a) Merge data from tables ✅
b) Create table
c) Remove table
d) Copy rows

76. Can ON clause use expressions?
a) Yes ✅
b) No
c) Only keys
d) Only INNER

77. JOIN with GROUP BY is:
    a) Not allowed
    b) Common ✅
    c) Only for INNER
    d) Invalid

78. CROSS JOIN is mostly used in:
    a) Small tables ✅
    b) Views only
    c) Delete
    d) Keys

79. Can JOIN be used with aliases?
    → Yes ✅

80. Which JOIN returns only common records?
    → INNER JOIN ✅

Session 12: Views, Indexes & Temporary Tables

Section 1: Views

1. A **view** in SQL is:
   a) A stored procedure
   b) A physical table
   c) A virtual table ✅
   d) A trigger

2. Views are created using:
   a) CREATE TABLE
   b) CREATE INDEX
   c) CREATE VIEW ✅
   d) ALTER VIEW

3. A view is based on:
   a) Stored procedures
   b) Other views
   c) One or more base tables ✅
   d) Sequences

4. A view that is based on a single table without any functions is:
   a) Complex view
   b) Simple view ✅
   c) Joined view
   d) Materialized view

5. A complex view involves:
   a) One table

b) Join, group, or functions ✅
c) Only insert
d) Indexes

6. Which of the following is NOT a valid type of view?
a) Simple view
b) Complex view
c) Real view ✅
d) Inline view

7. Views are:
a) Stored physically
b) Recomputed every time ✅
c) Faster than tables
d) Stored with indexes

8. The main use of a view is to:
a) Store data
b) Simplify queries ✅
c) Create sequences
d) Maintain tables

9. Which command removes a view?
a) DELETE VIEW
b) TRUNCATE VIEW
c) DROP VIEW ✅
d) REMOVE VIEW

10. Which view supports INSERT and DELETE operations?
a) Simple ✅
b) Complex
c) Indexed
d) Nested

11. Can we update a complex view directly?
a) Yes
b) No ✅
c) Always
d) Depends on DBMS

12. Which of the following is TRUE about views?
a) Views can’t be queried
b) Views are stored procedures
c) Views provide security ✅
d) Views use triggers

13. Which clause can be used to restrict update on view?
a) NO UPDATE
b) WITH READ ONLY ✅

c) NOT NULL
d) RESTRICT

14. What is an inline view?
    a) Temporary view inside FROM clause ✅
    b) Permanent table
    c) View from system table
    d) Function-based view

15. What is the result of selecting from a view?
    a) Permanent table
    b) Live data from base table ✅
    c) Static copy
    d) Stored values

16. Can you use GROUP BY in a view?
    → Yes ✅

17. Can a view contain JOINs?
    → Yes ✅

18. A view helps in:
    a) Data deletion
    b) Data hiding and abstraction ✅
    c) Auto-joins
    d) Data normalization

19. Updating a view is only possible when:
    a) It’s complex
    b) It has aggregation
    c) It is based on a single table ✅
    d) It has indexes

20. Can a view be nested (view on a view)?
    → Yes ✅

21. What happens if you delete a view?
    a) Deletes data
    b) Deletes table
    c) Deletes only view definition ✅
    d) Deletes schema

22. Materialized view is:
    a) A virtual table
    b) A stored snapshot of data ✅
    c) Not updatable
    d) Always faster

23. Views provide a level of:
    a) Backup

b) Abstraction ✅
c) Formatting
d) Optimization

24. Which of the following is not allowed in a simple view?
a) SELECT *
b) JOIN ✅
c) WHERE
d) ORDER BY

25. Can a view include a WHERE clause?
→ Yes ✅

26. What is true about view updates?
a) Always allowed
b) Allowed for simple views ✅
c) Required for complex
d) Never allowed

27. A view does NOT:
a) Occupy space
b) Improve security
c) Store data ✅
d) Access multiple tables

28. What clause is used to change a view?
a) ALTER VIEW ✅
b) MODIFY VIEW
c) CHANGE VIEW
d) UPDATE VIEW

29. Views can reduce:
a) Execution
b) Storage
c) Query complexity ✅
d) Primary key

30. A read-only view is defined with:
→ WITH READ ONLY ✅

31. Can a view have ORDER BY?
a) Yes, in query ✅
b) No
c) Only in MySQL
d) Only for functions

32. Which of the following can be used inside a view?
a) Aggregate function ✅
b) Insert

c) Delete
d) Truncate

33. A view becomes invalid when:
a) Table is dropped ✅
b) Table is updated
c) Query is optimized
d) Index is added

34. Views can be used to:
a) Backup database
b) Replace primary keys
c) Provide logical subset of data ✅
d) Create foreign keys

35. Inline views are used primarily:
a) Outside subqueries
b) Within SELECT
c) Inside FROM clause ✅
d) For DML

36. Complex views include:
a) Simple SELECT
b) Join, aggregate, group ✅
c) INSERTs
d) Constraints

37. Can a view restrict column access?
→ Yes ✅

38. Using SELECT * FROM view_name; will:
a) Create table
b) Query base table ✅
c) Modify schema
d) Execute triggers

39. Which of the following can a view NOT contain?
a) Subquery
b) GROUP BY
c) JOIN
d) DML ✅

40. What happens when base table changes?
a) View breaks
b) View updates automatically ✅
c) View duplicates
d) Nothing

Section 2: Indexes

41. What is an index in SQL?
    a) Table
    b) Data structure to speed up retrieval ✅
    c) Trigger
    d) View

42. An index improves:
    a) INSERT speed
    b) DELETE speed
    c) SELECT performance ✅
    d) Storage

43. Indexes are created on:
    a) Tables ✅
    b) Views
    c) Procedures
    d) Sequences

44. Indexes reduce the time for:
    a) Searching ✅
    b) Inserting
    c) Dropping tables
    d) Altering schema

45. An index is similar to:
    a) A key
    b) A search pointer ✅
    c) A foreign key
    d) A join

46. Primary key automatically creates:
    a) Unique key
    b) Index ✅
    c) View
    d) Trigger

47. Which command is used to create index?
    a) MAKE INDEX
    b) CREATE INDEX ✅
    c) NEW INDEX
    d) INDEX CREATE

48. What type of index is created by default?
    a) Bitmap
    b) Clustered ✅

c) Reverse
d) Text

49. A unique index:
a) Allows duplicates
b) Does not allow NULLs
c) Enforces uniqueness ✅
d) Is a view

50. Which index supports non-unique values?
a) Unique
b) Bitmap ✅
c) Composite
d) Primary

51. Composite index is created on:
a) One column
b) Two or more columns ✅
c) Temporary table
d) View

52. Indexes occupy:
a) No memory
b) Some additional disk space ✅
c) Constant space
d) NULL

53. Downsides of indexes include:
a) Higher insert/update time ✅
b) Slower select
c) Poor joins
d) Less readable

54. Clustered index stores:
a) Duplicates
b) Data physically sorted ✅
c) NULLs
d) Table copies

55. Non-clustered index stores:
a) Data inline
b) Pointers to actual data ✅
c) Nulls
d) Views

56. To drop an index:
a) DELETE INDEX
b) REMOVE INDEX

c) DROP INDEX ✅
d) TRUNCATE INDEX

57. Unique index is used when:
a) Speed needed
b) Data is repeated
c) Data must be unique ✅
d) All above

58. Bitmap indexes are best for:
a) Large text
b) Low cardinality data ✅
c) High cardinality
d) Stored procedures

59. Indexing a foreign key column helps:
a) Insert
b) Join operations ✅
c) Create triggers
d) Drop table

60. Indexes can be created on:
a) CHAR
b) DATE
c) VARCHAR
d) All ✅

61. Composite indexes can improve:
a) Sorting only
b) Single-column queries
c) Multi-column queries ✅
d) DML

62. What affects index performance?
a) Table size
b) Index type
c) Query pattern
d) All ✅

63. Indexes do NOT help with:
a) WHERE
b) JOIN
c) GROUP BY
d) INSERT ✅

64. To see performance of indexes:
a) Query EXPLAIN plan ✅
b) JOIN plan

c) SHOW ALL
d) TEST INDEX

65. Which index is best for columns with many duplicate values?
a) Unique
b) Hash
c) Bitmap ✅
d) Clustered

66. A table can have:
a) 1 index
b) 2 indexes
c) Many indexes ✅
d) No index

67. Indexes can be used in:
a) SELECT ✅
b) INSERT
c) DELETE
d) DROP

68. Index helps especially when:
a) Table has 100 rows
b) Table has millions of rows ✅
c) Views used
d) Keys disabled

69. Can we index expression-based columns?
→ Yes ✅

70. Indexes help with:
a) Select, join ✅
b) Create
c) Drop
d) Backup

71. Full-text index is used for:
a) Integer
b) Text search ✅
c) Boolean
d) PK

Section 3: Temporary Tables

---

81. Temporary tables are created using:
a) CREATE TEMPORARY TABLE ✅

b) CREATE TABLE
c) NEW TABLE
d) TEMP TABLE

82. Temporary tables are used for:
a) Storing data permanently
b) Backup
c) Intermediate results ✅
d) Views

83. Temporary tables are stored:
a) On disk
b) In memory ✅
c) Permanently
d) In logs

84. Scope of temporary table is:
a) Session ✅
b) Global
c) Forever
d) Public

85. Temporary table is dropped:
a) By DROP only
b) Automatically when session ends ✅
c) After reboot
d) Manually

86. Temporary tables help reduce:
a) Network traffic ✅
b) Storage
c) Indexes
d) Functions

87. Can indexes be created on temporary tables?
→ Yes ✅

88. Which statement is true?
a) Temp tables visible to all users
b) They persist in DB
c) They vanish after session ✅
d) They are faster than views

89. Can you use DML on temp tables?
→ Yes ✅

90. A global temporary table differs by:
a) Available to all sessions ✅
b) Faster

c) Hidden
d) Encrypted

91. Can we use JOINs on temp tables?
→ Yes ✅

92. Temporary tables can be used in:
a) Subqueries ✅
b) Views
c) Procedures
d) All ✅

93. Data in temporary table is:
a) Permanent
b) Stored in session ✅
c) Saved to disk
d) Read-only

94. Can you SELECT from a temp table?
→ Yes ✅

95. Temporary table name is:
a) Global
b) Local ✅
c) Public
d) Auto-generated

96. Can you drop a temp table?
→ Yes ✅

97. Best use of temp tables:
a) Join simplification ✅
b) Views
c) Triggers
d) Indexing

98. Which helps in debugging queries?
a) Stored procs
b) Views
c) Temp tables ✅
d) Primary key

99. Temporary tables are useful for:
a) Audit logging
b) Intermediate storage ✅
c) PK definition
d) Dropping schema

100. Dropping a temp table manually:
a) DROP TEMP

b) DELETE TABLE
c) DROP TABLE table_name ✅
d) REMOVE TEMP

Session 13: Stored Procedures, Benefits & Parameters (IN, OUT, INOUT)

Section 1: Introduction to Stored Procedures

---

1. A stored procedure is:
   a) A type of view
   b) A precompiled SQL block ✅
   c) A trigger
   d) A user
2. Stored procedures are stored in:
   a) Application layer
   b) Client machine
   c) Database server ✅
   d) Memory only
3. The main purpose of stored procedures is to:
   a) Replace tables
   b) Automate database tasks ✅
   c) Define keys
   d) Backup data
4. Stored procedures are written in:
   a) HTML
   b) PL/SQL, T-SQL, or procedural SQL ✅
   c) JSON
   d) DCL
5. Which command is used to create a stored procedure?
   a) CREATE FUNCTION
   b) CREATE PROC or CREATE PROCEDURE ✅
   c) CREATE TRIGGER
   d) CREATE JOB
6. Stored procedures support which type of SQL statements?
   a) DML only
   b) DDL only
   c) DML, DDL, and Control statements ✅
   d) SELECT only
7. A stored procedure must begin with:
   a) TRIGGER
   b) BEGIN...END block ✅

c) SELECT statement
d) WHERE clause

8. Stored procedures can return:
a) Multiple rows
b) Scalar values
c) Output parameters
d) All of the above ✅

9. Stored procedures are precompiled to:
a) Consume more resources
b) Increase execution speed ✅
c) Generate triggers
d) Modify schema

10. A stored procedure can be executed by:
a) SELECT
b) EXEC or CALL ✅
c) INSERT
d) GRANT

11. Which of the following is NOT a valid advantage of stored procedures?
a) Code reuse
b) Enhanced security
c) Portability between all RDBMS ✅
d) Centralized logic

12. Which RDBMS supports stored procedures?
a) MySQL
b) Oracle
c) SQL Server
d) All of the above ✅

13. Which is NOT a characteristic of stored procedures?
a) Reusable
b) Precompiled
c) Temporary ✅
d) Modular

14. A stored procedure helps minimize:
a) Network traffic ✅
b) Table creation
c) Disk I/O
d) Index lookup

15. A procedure can be nested within:
a) Another procedure ✅
b) A column

c) A trigger
d) A view

16. Can stored procedures contain loops and conditions?
→ Yes ✅

17. Which is faster:
a) Dynamic SQL
b) Stored procedure ✅
c) View
d) Function

18. Stored procedures reduce:
a) Application logic
b) Execution cost
c) Code redundancy
d) All ✅

19. Stored procedure differs from a function by:
a) Function must return value ✅
b) Procedure must return value
c) Function can't take arguments
d) Procedure has no logic

20. Which keyword is used to return from a procedure?
a) RETURN ✅
b) END
c) EXIT
d) BREAK

21. Stored procedures improve security by:
a) Hiding schema logic ✅
b) Granting all access
c) Avoiding constraints
d) Skipping login

22. In SQL Server, procedure creation ends with:
a) /
b) GO ✅
c) ;
d) $

23. You can prevent changes to a procedure using:
a) LOCK
b) ENCRYPTION ✅
c) READ ONLY
d) HASH

24. A stored procedure can be invoked from:
   a) Application code
   b) Trigger
   c) Another procedure
   d) All ✅

25. Recursive procedures are:
   a) Not allowed
   b) Allowed in Oracle
   c) Allowed in many DBMS ✅
   d) Only for triggers

26. Which clause allows altering a stored procedure?
   a) MODIFY PROCEDURE
   b) ALTER PROCEDURE ✅
   c) CHANGE
   d) CREATE OR REPLACE

27. Stored procedure parameters must be declared:
   a) Inside SELECT
   b) In parentheses ✅
   c) Outside procedure
   d) Inside table

28. A stored procedure can handle exceptions using:
   a) TRY-CATCH ✅
   b) LIMIT
   c) SKIP
   d) REJECT

29. Which of these is not used inside a procedure?
   a) DECLARE
   b) SET
   c) GOTO ✅
   d) IF

30. What will happen if you DROP a procedure?
   a) Its code remains
   b) Procedure is deleted ✅
   c) Table is dropped
   d) Data is lost

31. What is the default mode of parameters in procedures?
   a) IN ✅
   b) OUT
   c) INOUT
   d) CONSTANT

32. Procedures are stored in:
   a) File system
   b) Database dictionary ✅
   c) Cache
   d) JSON

33. Best use case for a procedure is:
   a) View creation
   b) One-time insert
   c) Repetitive task ✅
   d) Granting access

34. Can a procedure call another procedure?
   → Yes ✅

35. Which keyword is used to start a procedure block?
   a) BEGIN ✅
   b) START
   c) OPEN
   d) INIT

36. The opposite of CREATE PROCEDURE is:
   a) REMOVE
   b) DROP PROCEDURE ✅
   c) DELETE
   d) ERASE

37. Procedures can reduce:
   a) I/O
   b) CPU
   c) Round trips between application and database ✅
   d) All

38. A stored procedure can accept how many parameters?
   a) Max 3
   b) 10
   c) Unlimited ✅
   d) None

39. Stored procedures can be tested using:
   a) SELECT
   b) EXECUTE ✅
   c) GRANT
   d) INSERT

40. Procedures differ from functions because functions:
   a) Return values ✅
   b) Are stored

c) Use BEGIN-END
d) Accept INOUT

Section 2: Procedure Parameters (IN, OUT, INOUT)

---

41. Parameters in stored procedures are used to:
a) Define keys
b) Pass values ✅
c) Drop views
d) None

42. How many types of parameters exist in procedures?
a) 1
b) 2
c) 3 ✅
d) 4

43. IN parameter is used to:
a) Pass values into procedure ✅
b) Get value out
c) Clear data
d) Loop rows

44. OUT parameter is used to:
a) Insert data
b) Pass value back to caller ✅
c) Accept user input
d) Log errors

45. INOUT parameter is used to:
a) Only input
b) Only output
c) Input and output ✅
d) None

46. Default parameter mode in most databases is:
a) OUT
b) IN ✅
c) INOUT
d) STATIC

47. Can procedures have no parameters?
→ Yes ✅

48. Which parameter mode is NOT supported by functions?
a) IN

b) OUT ✅
c) INOUT ✅
d) All above

49. IN parameter values are:
a) Writable
b) Read-only ✅
c) Persistent
d) Auto-stored

50. OUT parameters must be:
a) Passed null
b) Set within procedure ✅
c) Not used
d) Static

51. INOUT parameters must be:
a) Ignored
b) Reset
c) Initialized and returned ✅
d) None

52. What happens if OUT param not set?
a) Returns NULL ✅
b) Procedure fails
c) Returns 0
d) Value copied from IN

53. IN parameters can be:
a) Constants
b) Expressions
c) NULL
d) All ✅

54. INOUT can be used when:
a) Input only
b) Return only
c) Both input and output needed ✅
d) Never

55. How do you set OUT parameter value?
a) RETURN
b) SET out_var = value ✅
c) SELECT
d) UPDATE

56. Which is true about OUT parameters?
a) Must be passed before execution
b) Are initialized outside

c) Are set inside procedure ✅
d) Are passed by value

57. INOUT parameters behave like:
a) Shared variables ✅
b) Cursors
c) Constants
d) Indexes

58. You can pass NULL to:
a) OUT
b) IN ✅
c) INOUT
d) ALL

59. Which mode is mandatory in procedure?
a) IN
b) OUT
c) INOUT
d) None ✅

60. OUT parameter values are returned to:
a) Table
b) Client ✅
c) Trigger
d) Server

61. Declaring a parameter requires:
a) Name
b) Mode (IN/OUT/INOUT)
c) Datatype
d) All ✅

62. IN parameters can be used in:
a) WHERE clause ✅
b) GROUP BY
c) TRIGGER
d) PRIMARY KEY

63. What happens if IN param is missing?
a) Error ✅
b) NULL passed
c) Default value used
d) Skipped

64. Which param type needs initialization before use?
a) IN
b) OUT ✅

c) INOUT
d) ALL

65. OUT param without SET will return:
a) Default
b) NULL ✅
c) IN value
d) 0

66. INOUT requires:
a) IN value
b) SET in procedure
c) Both ✅
d) None

67. What happens if INOUT is not declared?
a) Error ✅
b) Implicit OUT
c) Null
d) IN assumed

68. OUT and INOUT help in:
a) Returning values ✅
b) Joins
c) Functions
d) Views

69. Parameter names must:
a) Match column
b) Be unique ✅
c) Be integers
d) Be static

70. You can use how many parameters in a procedure?
a) 5
b) 10
c) Unlimited ✅
d) None

71. Procedure param data types must match:
a) View
b) Table
c) Variable assigned ✅
d) Procedure name

72. OUT parameters allow:
a) Input
b) Output ✅

c) Triggers
d) Loops

73. OUT parameters can return:
a) Single value ✅
b) Tables
c) Keys
d) NULL only

74. INOUT is useful in:
a) Logging
b) Reusable logic ✅
c) Triggers
d) Indexing

75. Can parameters be declared with default values?
→ Yes ✅

76. Which clause sets parameter values on call?
a) EXEC/EXECUTE with values ✅
b) INSERT
c) TRIGGER
d) CURSOR

77. INOUT example usage:
a) Increase counter ✅
b) Print
c) Log
d) Drop schema

78. DECLARE keyword is used for:
a) Param in procedure ✅
b) Index
c) View
d) Column

79. OUT parameters are visible after:
a) CREATE
b) EXEC ✅
c) INSERT
d) TRIGGER

80. Param values in EXEC must match:
a) Order ✅
b) Name
c) Column
d) Table

81. Can you use SELECT to return OUT param value?
→ Yes ✅

82. Which keyword returns OUT param in MySQL CLI?
a) SELECT var ✅
b) SHOW
c) UPDATE
d) RETURN

83. SET @var = value assigns:
a) Param value ✅
b) Index
c) View
d) Key

84. Can param be array?
a) Not in standard SQL ✅
b) Always
c) Required
d) Default

85. Output param can be:
a) Number
b) Text
c) Date
d) All ✅

86. What should be used to modify OUT param?
a) SET ✅
b) RETURN
c) CREATE
d) GOTO

87. Can INOUT param be NULL?
→ Yes ✅

88. Order of parameter declaration is:
a) OUT, IN
b) IN, OUT, INOUT ✅
c) ANY
d) Not required

89. Which param must be initialized before use?
a) OUT
b) IN ✅
c) INOUT
d) All

90. OUT param helps simulate:
   a) RETURN statement ✅
   b) JOIN
   c) View
   d) Table

91. INOUT helps update:
   a) Columns
   b) Memory value ✅
   c) Keys
   d) Schema

92. INOUT must be passed as:
   a) Constant
   b) Variable ✅
   c) NULL
   d) NONE

93. OUT param stores result:
   a) After EXEC ✅
   b) Before EXEC
   c) At runtime
   d) Always NULL

94. INOUT acts like:
   a) Combined IN & OUT ✅
   b) Loop
   c) Trigger
   d) Cursor

95. OUT parameter must be:
   a) Passed NULL
   b) Returned by value ✅
   c) Dropped
   d) Created first

96. OUT parameters help when function:
   a) Can’t return multiple values ✅
   b) Has return
   c) Skips logic
   d) Uses cursor

97. INOUT can store and modify:
   a) Same value ✅
   b) Table
   c) Key
   d) View

98. Which type returns value implicitly?
a) IN
b) OUT
c) INOUT
d) Function ✅

99. Can you use SELECT INTO OUT param?
→ Yes ✅

100. Best practice for OUT parameters is:
a) Set once ✅
b) Always NULL
c) Skip check
d) Avoid values

Session 14 – NoSQL Databases

Section 1: Introduction to NoSQL

---

1. What does NoSQL stand for?
a) No Structured Query Language ✅
b) Not Only SQL
c) Non-standard SQL
d) Not SQL at all

2. NoSQL databases are primarily designed for:
a) Structured data only
b) Fixed-schema models
c) Unstructured and semi-structured data ✅
d) Stored procedures

3. One of the primary reasons for adopting NoSQL is:
a) Low security
b) Fixed schemas
c) Scalability and flexibility ✅
d) Slow transactions

4. NoSQL databases emerged due to limitations in:
a) XML
b) Traditional RDBMS at large scale ✅
c) Programming languages
d) Operating systems

5. Which of the following is true about NoSQL?
a) It always uses SQL
b) It stores only relational data
c) It is schema-less ✅
d) It enforces ACID strictly

6. NoSQL is best suited for:
   a) Simple desktop apps
   b) Mobile games
   c) Big Data and real-time web apps ✅
   d) Compilers

7. Which one of the following is a NoSQL database?
   a) Oracle
   b) MongoDB ✅
   c) MySQL
   d) SQL Server

8. NoSQL is commonly used in:
   a) Banking systems
   b) Small-scale static websites
   c) Social media platforms ✅
   d) Payroll software

9. Which of the following is a benefit of NoSQL?
   a) Strong schema enforcement
   b) Vertical scaling only
   c) High flexibility in data modeling ✅
   d) Slow performance

10. In NoSQL, data is typically stored in:
    a) Tables and rows
    b) Files
    c) Collections and documents ✅
    d) Keys and triggers

11. Which feature is not associated with NoSQL?
    a) Horizontal scalability
    b) Schema-less design
    c) Table joins ✅
    d) High performance

12. Which term is often associated with NoSQL databases?
    a) Joins
    b) Big Data ✅
    c) Transactions only
    d) Schema locking

13. NoSQL was mainly built to support:
    a) Relational data
    b) Consistency over availability
    c) Distributed and scalable architectures ✅
    d) Stored functions

14. CAP Theorem relates to:
    a) NoSQL only ✅
    b) SQL only
    c) Indexes
    d) Normalization

15. NoSQL favors:
    a) ACID
    b) BASE ✅
    c) CORS
    d) CRUD

16. BASE stands for:
    a) Basically Available, Soft state, Eventually consistent ✅
    b) Basic Attributes Structured Encoding
    c) Basic Array Stored Elements
    d) Base-level SQL

17. The NoSQL movement started around:
    a) 1980
    b) 1998
    c) 2009 ✅
    d) 2015

18. NoSQL is highly favored in which architecture?
    a) Monolithic
    b) Client-server
    c) Microservices ✅
    d) Desktop apps

19. JSON is commonly used in:
    a) RDBMS
    b) Views
    c) NoSQL Document databases ✅
    d) Keys only

20. NoSQL databases are mostly:
    a) Normalized
    b) Table-oriented
    c) Non-relational ✅
    d) Constraint-heavy

Section 2: NoSQL Database Types

---

21. Which is a document-based NoSQL DB?
    a) MySQL

b) MongoDB ✅
c) Neo4j
d) Cassandra

22. A key-value store stores data as:
a) JSON
b) Tables
c) Keys and associated values ✅
d) Columns

23. Redis is an example of a:
a) Columnar DB
b) Key-value store ✅
c) Document DB
d) RDBMS

24. Which NoSQL type is optimized for relationships?
a) Key-Value
b) Document
c) Graph ✅
d) Column

25. Columnar NoSQL databases store:
a) Data in documents
b) Data in columns ✅
c) Data in tables
d) Keys only

26. Which of the following is a column-based NoSQL DB?
a) Oracle
b) CouchDB
c) Cassandra ✅
d) MongoDB

27. Neo4j is a:
a) Column DB
b) Key-Value
c) Graph database ✅
d) Relational database

28. Which type of NoSQL DB works best for social networks?
a) Document
b) Key-Value
c) Graph ✅
d) Column

29. Which database is best suited for storing documents in JSON?
a) PostgreSQL
b) MongoDB ✅

c) Cassandra
d) SQL Server

30. A graph database contains:
a) Rows
b) Columns
c) Nodes and Edges ✅
d) Keys

31. The most flexible NoSQL model is:
a) Key-Value
b) Graph
c) Document ✅
d) RDBMS

32. CouchDB is a:
a) Key-Value DB
b) Document store ✅
c) Columnar DB
d) Graph DB

33. The best NoSQL type for analytics is:
a) Key-Value
b) Column-oriented ✅
c) Graph
d) Document

34. What is stored in a key-value store?
a) Documents
b) Binary trees
c) Keys with associated values ✅
d) Tables

35. Which NoSQL type does not support querying deeply nested data well?
a) Document
b) Key-Value ✅
c) Graph
d) Columnar

36. A document store stores data in:
a) Tables
b) XML
c) JSON/BSON ✅
d) CSV

37. Columnar DBs are best suited for:
a) Data warehouses ✅
b) Graph processing

c) Transactions
d) Key-value updates

38. Which is the oldest NoSQL model?
a) Key-Value ✅
b) Graph
c) Document
d) Column

39. Graph DBs are used heavily in:
a) E-commerce
b) Social networks ✅
c) Retail
d) Banking

40. Which type allows indexing of individual fields within a document?
a) Columnar
b) Document ✅
c) Graph
d) Key-Value

Section 3: Features of NoSQL

---

41. A common feature of NoSQL DBs is:
a) Schema rigidity
b) Join support
c) Horizontal scalability ✅
d) Stored procedures

42. NoSQL databases often use:
a) Normalization
b) Indexes
c) Denormalization ✅
d) ER modeling

43. NoSQL databases support:
a) Consistency over everything
b) Distributed data ✅
c) Local storage only
d) Fixed schemas

44. Data in NoSQL is:
a) Normalized
b) Always structured
c) Often semi-structured ✅
d) Table-based

45. Which of the following is NOT a NoSQL DB feature?
   a) Schema flexibility
   b) Rich relationships via JOINs ✅
   c) High performance
   d) Easy sharding

46. Which architecture is supported by most NoSQL DBs?
   a) Master-slave
   b) Distributed ✅
   c) Client-server
   d) Threaded

47. Which ensures availability in NoSQL?
   a) ACID
   b) CAP Theorem ✅
   c) ISO
   d) Locking

48. Which of these is NOT a reason for using NoSQL?
   a) Handling unstructured data
   b) Easy scaling
   c) Fixed schema enforcement ✅
   d) Real-time performance

49. What kind of scaling is typical of NoSQL systems?
   a) Vertical
   b) Horizontal ✅
   c) Parallel
   d) None

50. NoSQL generally uses what type of consistency?
   a) Strong
   b) Eventual ✅
   c) Global
   d) Null

51. One key benefit of NoSQL is:
   a) Tight coupling
   b) Ease of complex joins
   c) High performance for Big Data ✅
   d) Lack of security

52. NoSQL excels in handling:
   a) Fixed schemas
   b) Table relationships
   c) Complex joins
   d) Rapidly changing data ✅

53. NoSQL DBs often support:
   a) JSON/BSON data ✅
   b) CSV only
   c) XML only
   d) YAML only

54. Sharding refers to:
   a) Normalizing data
   b) Vertical scaling
   c) Splitting data across multiple servers ✅
   d) Caching indexes

55. Availability in NoSQL is ensured through:
   a) JOINs
   b) Replication ✅
   c) Grouping
   d) View merging

56. NoSQL performance is better in:
   a) Relational data
   b) Large volume and low latency operations ✅
   c) Table sorting
   d) Multi-table queries

57. NoSQL is less prone to:
   a) Scalability issues ✅
   b) Data corruption
   c) Flexibility
   d) Document usage

58. What makes NoSQL flexible?
   a) Rigid typing
   b) Schema-less nature ✅
   c) Binary indexes
   d) Table partitioning

59. Which database can grow across nodes easily?
   a) RDBMS
   b) NoSQL ✅
   c) MySQL
   d) Oracle

60. NoSQL supports high:
   a) Normalization
   b) Locking
   c) Throughput ✅
   d) Redundancy

Section 4: Structured, Semi-structured & Unstructured Data

---

61. Structured data is stored in:
    a) Images
    b) Tables ✅
    c) Text documents
    d) Binary files

62. Semi-structured data is usually in:
    a) JSON, XML ✅
    b) Tables
    c) Images
    d) Spreadsheets

63. Unstructured data includes:
    a) CSV
    b) Images and videos ✅
    c) XML
    d) SQL

64. Structured data has:
    a) No fixed format
    b) Partial tags
    c) Predefined schema ✅
    d) Loose data

65. Examples of structured data:
    a) Video logs
    b) SQL databases ✅
    c) JSON documents
    d) PDF

66. Semi-structured data supports:
    a) Strong data types
    b) Partial structure ✅
    c) None
    d) Full normalization

67. Examples of unstructured data:
    a) Emails, chat logs ✅
    b) Excel
    c) Tables
    d) XML

68. Which is not a characteristic of structured data?
    a) Rigid schema
    b) SQL compatibility

c) Complex joins
d) Binary storage ✅

69. Structured data is easier to:
a) Parse ✅
b) Compress
c) Embed
d) Encode

70. Semi-structured data is common in:
a) Relational DB
b) NoSQL systems ✅
c) Triggers
d) Graph DB

Section 5: RDBMS vs NoSQL

---

71. RDBMS use:
a) Schema-less models
b) Fixed schema ✅
c) JSON
d) Unstructured data

72. NoSQL supports:
a) Tables
b) Flexible data models ✅
c) Primary-foreign keys
d) Only numbers

73. RDBMS use:
a) ACID ✅
b) BASE
c) Document model
d) CAP

74. NoSQL favors:
a) ACID
b) BASE ✅
c) Full consistency
d) Transactions

75. RDBMS are best for:
a) Social media
b) OLTP systems ✅
c) Unstructured data
d) IoT

76. NoSQL is preferred in:
a) Banking
b) Data warehouse
c) Real-time analytics ✅
d) Core ERP

77. RDBMS is better for:
a) Flexible schema
b) Complex relationships ✅
c) JSON
d) Eventual consistency

78. RDBMS scaling is mostly:
a) Horizontal
b) Vertical ✅
c) Schema-based
d) Client-based

79. NoSQL is known for:
a) Inflexibility
b) Auto-normalization
c) Scalability and flexibility ✅
d) Low availability

80. RDBMS supports:
a) JSON
b) Joins ✅
c) Keys only
d) No foreign keys

81. NoSQL databases rarely support:
a) SQL queries ✅
b) Indexes
c) Documents
d) Keys

82. In RDBMS, normalization is:
a) Optional
b) Required ✅
c) Never used
d) Deprecated

83. In NoSQL, normalization is:
a) Standard
b) Avoided ✅
c) Required
d) Enforced

84. RDBMS follows which design?
   a) Denormalized
   b) Entity-relationship ✅
   c) Columnar
   d) Key-value

85. Which is true?
   a) RDBMS has high flexibility
   b) NoSQL is ideal for changing schemas ✅
   c) SQL stores files
   d) NoSQL can't handle JSON

86. RDBMS requires:
   a) Defined schema ✅
   b) Dynamic keys
   c) JSON structure
   d) Loose typing

87. NoSQL does not require:
   a) Queries
   b) Schema ✅
   c) Index
   d) Data

88. NoSQL shines when:
   a) Data size is fixed
   b) Schema is strict
   c) Data volume is huge ✅
   d) Joins are needed

89. RDBMS relationships are enforced using:
   a) JSON
   b) Foreign keys ✅
   c) Keys only
   d) Replication

90. NoSQL databases use what for relation-like logic?
   a) Joins
   b) Embedding or referencing ✅
   c) Cursors
   d) Sequences

91. NoSQL sacrifices consistency for:
   a) Availability and partition tolerance ✅
   b) Redundancy
   c) Indexing
   d) Normalization

92. RDBMS scales by:
a) Splitting tables
b) Vertical hardware upgrade ✅
c) Sharding
d) Indexing

93. NoSQL scales by:
a) Adding joins
b) Foreign keys
c) Adding more nodes ✅
d) Locking

94. RDBMS are best when:
a) Schema is not fixed
b) Data is large
c) Strong consistency is needed ✅
d) Eventual consistency is OK

95. NoSQL works well when:
a) You need SQL
b) Data model is rigid
c) You expect frequent schema changes ✅
d) You need triggers

96. RDBMSs are:
a) Inherently distributed
b) Monolithic ✅
c) Document-based
d) Event-driven

97. NoSQL supports:
a) Triggers
b) Tables
c) Flexible data models ✅
d) Constraints

98. NoSQL avoids:
a) Transactions
b) Foreign keys ✅
c) JSON
d) Documents

99. RDBMS ensures data integrity via:
a) JSON
b) Joins
c) Constraints and keys ✅
d) Arrays

100. Which is true?
a) NoSQL is best for strict schema
b) RDBMS scales horizontally
c) RDBMS supports ACID, NoSQL supports BASE ✅
d) SQL uses JSON natively

Session 15 – MongoDB

Section 1: Introduction to MongoDB & Its Benefits

---

1. MongoDB is a:
a) Relational database
b) Graph database
c) Document-oriented NoSQL database ✅
d) Key-value store

2. MongoDB stores data in:
a) Tables
b) Documents ✅
c) Columns
d) Trees

3. MongoDB documents are stored in:
a) Databases
b) Fields
c) Collections ✅
d) Rows

4. One major benefit of MongoDB is:
a) Fixed schemas
b) ACID transaction support only
c) Flexible schema ✅
d) Data redundancy

5. Which of the following is a file format used by MongoDB?
a) XML
b) BSON ✅
c) CSV
d) SQL

6. MongoDB is best suited for:
a) Heavy joins
b) Unstructured and semi-structured data ✅
c) High transaction banking
d) Flat data

7. MongoDB supports horizontal scaling via:
a) Clustering

b) Joins
c) Sharding ✅
d) Indexing

8. MongoDB was developed by:
   a) Google
   b) Microsoft
   c) MongoDB Inc ✅
   d) Oracle

9. One key advantage of MongoDB over RDBMS is:
   a) Triggers
   b) Data joins
   c) Schema-less design ✅
   d) Foreign key support

10. MongoDB stores data as:
    a) Arrays
    b) Tables
    c) JSON-like documents ✅
    d) CSV

11. Which of the following is a benefit of MongoDB?
    a) Vertical scaling
    b) High latency
    c) Real-time analytics ✅
    d) Slow performance

12. In MongoDB, data redundancy is minimized by:
    a) Normalization
    b) Embedding documents ✅
    c) Indexing
    d) Subqueries

13. MongoDB excels in:
    a) Handling static data
    b) Handling dynamic data ✅
    c) Table joins
    d) Stored procedures

14. MongoDB supports which kind of storage?
    a) Columnar
    b) Binary
    c) Document ✅
    d) Graph

15. MongoDB is written in:
    a) Java
    b) Python

c) C++ ✅
d) SQL

16. MongoDB is available on:
a) Windows only
b) Linux only
c) Cross-platform ✅
d) Android only

17. MongoDB Atlas is:
a) Local version
b) Cloud-hosted MongoDB ✅
c) Compass alternative
d) A visualization tool

18. MongoDB allows:
a) Storing documents without schema ✅
b) Mandatory schema definitions
c) Only SQL-like operations
d) Stored procedures

19. MongoDB is NOT ideal for:
a) Real-time analytics
b) Social media apps
c) Banking applications ✅
d) Content management systems

20. MongoDB handles large volumes of:
a) Structured data
b) Binary trees
c) Unstructured data ✅
d) Static XML

Section 2: Features of MongoDB

---

21. MongoDB supports:
a) Tables
b) Document embedding ✅
c) Primary-foreign keys
d) Triggers

22. A key feature of MongoDB is:
a) Foreign keys
b) Strong normalization
c) Indexing ✅
d) Composite primary keys

23. BSON stands for:
 a) Binary JSON ✅
 b) Base Schema Object Notation
 c) Binary SQL
 d) Big Structured Object Notation

24. MongoDB supports high availability via:
 a) Clustering
 b) Replication ✅
 c) Caching
 d) Normalization

25. MongoDB collections are analogous to:
 a) Rows
 b) Tables ✅
 c) Indexes
 d) Fields

26. Which of the following is a data type in MongoDB?
 a) float
 b) int
 c) ObjectId ✅
 d) date-time

27. MongoDB supports dynamic:
 a) Indexes
 b) Schemas ✅
 c) Tables
 d) Triggers

28. Which command shows all databases?
 a) SHOW DATABASES ✅
 b) LIST
 c) DB LIST
 d) DB.INFO()

29. MongoDB stores each record as a:
 a) Document ✅
 b) Cell
 c) Table
 d) View

30. Which of the following features improves read speed?
 a) Triggers
 b) Indexes ✅
 c) Views
 d) Constraints

31. MongoDB Compass is used for:
a) Coding
b) Schema enforcement
c) GUI-based database management ✅
d) Replication

32. In MongoDB, arrays can be:
a) Nested within documents ✅
b) Used as keys
c) Primary keys
d) External

33. Which ensures data integrity in MongoDB?
a) Transactions ✅
b) Triggers
c) Functions
d) Keys

34. MongoDB supports ACID transactions from:
a) Version 2
b) Version 3.2
c) Version 4.0 ✅
d) Version 6.0

35. Which is NOT a MongoDB feature?
a) Joins ✅
b) Sharding
c) Indexing
d) Replication

36. MongoDB provides:
a) Strong joins
b) Built-in horizontal scalability ✅
c) Table locking
d) Fixed schemas

37. MongoDB allows:
a) Field-level encryption ✅
b) Key-based joins
c) NULL-only fields
d) Schema triggers

38. To access a Mongo shell, the command is:
a) mongo ✅
b) mongodb
c) connect-db
d) mongo-shell

39. MongoDB stores "_id" field as:
    a) Text
    b) Integer
    c) ObjectId ✅
    d) Date

40. MongoDB handles failover via:
    a) Shards
    b) Replica sets ✅
    c) Views
    d) Functions

Section 3: MongoDB Interface, Compass, Documents & Collections

---

41. The MongoDB shell is a:
    a) GUI
    b) CLI ✅
    c) IDE
    d) Dashboard

42. MongoDB Compass is:
    a) Code editor
    b) Visual GUI for MongoDB ✅
    c) Authentication manager
    d) Indexing tool

43. A MongoDB document resembles:
    a) A spreadsheet
    b) A table
    c) A JSON object ✅
    d) An XML file

44. Which of the following is a valid document format?
    a) CSV
    b) BSON ✅
    c) TXT
    d) XLS

45. A collection contains:
    a) Tables
    b) Arrays
    c) Documents ✅
    d) Views

46. A document in MongoDB is stored as:
    a) Key-value pairs ✅

b) Fixed fields
c) CSV rows
d) XML nodes

47. MongoDB collections are similar to:
a) Fields
b) Databases
c) Tables ✅
d) Files

48. Each MongoDB document must have a:
a) Primary key
b) Unique ObjectId in _id ✅
c) Name field
d) Tag

49. Mongo shell can be exited using:
a) stop
b) exit ✅
c) quit()
d) db.exit

50. You can create a new database in Mongo by using:
a) CREATE DATABASE
b) USE dbname ✅
c) NEW DB
d) MAKE DATABASE

51. Compass allows you to:
a) Write HTML
b) View documents visually ✅
c) Backup databases
d) Trigger events

52. The default port for MongoDB is:
a) 27017 ✅
b) 3306
c) 1433
d) 1521

53. MongoDB collection names:
a) Are case-sensitive ✅
b) Must be uppercase
c) Must be lowercase
d) Require _ only

54. Which field is created automatically in every document?
a) name
b) id

c) _id ✅
d) key

55. Can you have nested fields in MongoDB?
→ Yes ✅

56. Collections in MongoDB are:
a) Pre-defined
b) Automatically created ✅
c) Manually defined only
d) Table-based

57. Which tool provides visual stats in MongoDB?
a) CLI
b) MongoDB Atlas
c) Compass ✅
d) Mongoose

58. Which shell command shows current DB?
a) show()
b) db ✅
c) getDB()
d) current()

59. Mongo shell data format:
a) BSON
b) JavaScript ✅
c) SQL
d) YAML

60. Can MongoDB documents have different structures in the same collection?
→ Yes ✅