DBMS & SQL Interview Questions

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1 Introduction to DBMS and SQL

1. **Which of the following is not a type of database model?**
    - a) Hierarchical
    - b) Relational
    - c) Object-oriented
    - d) Tabular
      Answer: d) Tabular
2. **What is the primary purpose of a DBMS?**
    - a) Perform calculations
    - b) Manage data efficiently
    - c) Provide internet access
    - d) Generate reports
      Answer: b) Manage data efficiently
3. **SQL stands for:**
    - a) Structured Question Language
    - b) Sequential Query Language
    - c) Structured Query Language
    - d) System Query Language
      Answer: c) Structured Query Language
4. **Which component of DBMS is responsible for query optimization?**
    - a) Storage Manager
    - b) Query Processor
    - c) Transaction Manager
    - d) Schema Manager
      Answer: b) Query Processor

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2 SQL Installation & Comments

5. **To comment out a single line in SQL, you use:**
    - a) #
    - b) --
    - c) /* */
    - d) //
      Answer: b) --
6. **In MySQL Workbench, which tab is used to execute SQL queries?**
    - a) Dashboard
    - b) Editor
    - c) Scripting
    - d) Query Execution
      Answer: b) Editor

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3 RDBMS Terminologies and Database Keys

7. **Which key is used to uniquely identify a record in a table?**
    - a) Candidate Key
    - b) Foreign Key
    - c) Primary Key
    - d) Composite Key
      Answer: c) Primary Key
8. **What is the term for a column or set of columns in a table that can act as a primary key?**
    - a) Alternate Key
    - b) Super Key
    - c) Composite Key
    - d) Candidate Key
      Answer: d) Candidate Key

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4 DDL Commands

9. **Which command is used to remove all rows from a table without deleting the table structure?**
    - a) DROP
    - b) DELETE
    - c) TRUNCATE
    - d) ALTER
      Answer: c) TRUNCATE
10. **Write an SQL query to create a table named Employees with columns ID (INT, Primary Key), Name (VARCHAR), and Salary (FLOAT)**

    CREATE TABLE Employees (

    ID INT PRIMARY KEY,

    Name VARCHAR(100),

    Salary FLOAT

    );

---

5 DML Commands

11. **Which DML command is used to modify data in an existing row?**
    - a) INSERT
    - b) UPDATE
    - c) DELETE
    - d) SELECT
      Answer: b) UPDATE
12. **Write an SQL query to insert a new record into the Employees table with values (1, 'John Doe', 5000)**
13. INSERT INTO Employees (ID, Name, Salary)
14. VALUES (1, 'John Doe', 5000);
15. **What does the SELECT statement do?**
    - a) Modify data
    - b) Retrieve data
    - c) Delete data

- d) Structure data
  Answer: b) Retrieve data

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6 DCL and TCL Commands

14. **Which of the following commands is used to give a user access to the database?**
    - a) COMMIT
    - b) GRANT
    - c) SAVEPOINT
    - d) ROLLBACK
      Answer: b) GRANT
15. **Write an SQL query to revoke DELETE privileges on the Employees table from user user1**
16. REVOKE DELETE ON Employees FROM user1;
17. **What does the COMMIT command do?**
    - a) Undo changes
    - b) Save changes
    - c) Grant privileges
    - d) Restrict access
      Answer: b) Save changes

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7 Clauses

17. **Which clause is used to filter records in a SELECT query?**
    - a) WHERE
    - b) ORDER BY
    - c) HAVING
    - d) DISTINCT
      Answer: a) WHERE
18. **Write an SQL query to retrieve distinct salaries from the Employees table**

    SELECT DISTINCT Salary FROM Employees;
19. **What does the ORDER BY clause do?**
    - a) Groups data

- b) Sorts data
- c) Filters data
- d) Deletes duplicates
  Answer: b) Sorts data

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8 Functions

20. **Which of the following is an aggregate function?**
    - a) NOW()
    - b) SUM()
    - c) CHAR_LENGTH()
    - d) CONCAT()
      Answer: b) SUM()
21. **Write an SQL query to calculate the total salary of all employees**

    SELECT SUM(Salary) AS TotalSalary FROM Employees;

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9 Joins

22. **Which JOIN returns only matching rows from both tables?**
    - a) INNER JOIN
    - b) LEFT JOIN
    - c) RIGHT JOIN
    - d) FULL JOIN
      Answer: a) INNER JOIN
23. **Write an SQL query to retrieve employee names and their department names using a JOIN between Employees and Departments**

    SELECT EmployeesName, DepartmentsDeptName

    FROM Employees

    INNER JOIN Departments

    ON EmployeesDeptID = DepartmentsID;

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10 Subqueries and Views

24. **Which of the following is true about a view?**
    - a) It stores data physically
    - b) It is a virtual table
    - c) It cannot have a WHERE clause
    - d) It does not support joins
      Answer: b) It is a virtual table
25. **Write an SQL query to create a view for all employees earning more than 4000**

    CREATE VIEW HighEarners AS

    SELECT * FROM Employees

    WHERE Salary > 4000;

---

11 Group By and Having

26. **Which clause is used to filter aggregated data?**
    - a) WHERE
    - b) GROUP BY
    - c) HAVING
    - d) ORDER BY
      Answer: c) HAVING
27. **Write an SQL query to calculate the average salary by department and show only those departments with an average salary greater than 3000**

    SELECT DeptID, AVG(Salary) AS AvgSalary

    FROM Employees

    GROUP BY DeptID

    HAVING AVG(Salary) > 3000;

---

12 Stored Procedures

28. **Which keyword is used to define a stored procedure?**
    - a) FUNCTION
    - b) PROCEDURE

- c) TRIGGER
- d) BLOCK
  Answer: b) PROCEDURE

29. **Write a stored procedure to increase all employee salaries by 10%**

```
CREATE PROCEDURE IncreaseSalaries()
BEGIN
    UPDATE Employees
    SET Salary = Salary * 11;
END;
```

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13 Triggers

30. **What is a trigger in SQL?**
    - a) A stored function
    - b) A database event
    - c) A join operation
    - d) A query optimizer
      Answer: b) A database event

31. **Write a trigger to log salary changes in a table SalaryLog after any update**

```
CREATE TRIGGER LogSalaryChange
AFTER UPDATE ON Employees
FOR EACH ROW
BEGIN
   INSERT INTO SalaryLog (EmpID, OldSalary, NewSalary, ChangeDate)
   VALUES (OLDID, OLDSalary, NEWSalary, NOW());
END;
```

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14 Normalization & Denormalization

32. **Which normalization form eliminates partial dependency?**
    - a) 1NF
    - b) 2NF

- c) 3NF
- d) BCNF
  Answer: b) 2NF

33. **What is denormalization?**
    - a) Process of removing redundancy
    - b) Process of adding redundancy
    - c) Splitting tables
    - d) Eliminating foreign keys
      Answer: b) Process of adding redundancy

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4 DDL Commands

34. **What does the RENAME command do?**
    - a) Renames a column in a table
    - b) Renames a table
    - c) Renames a database
    - d) Renames a user
      Answer: b) Renames a table

35. **Write an SQL query to rename the table Employees to Staff**

    RENAME TABLE Employees TO Staff;

36. **Which of the following is not a valid SQL data type?**
    - a) INT
    - b) VARCHAR
    - c) FLOAT
    - d) CHARINT
      Answer: d) CHARINT

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5 DML Commands

37. **What does the DELETE statement do?**
    - a) Deletes a table structure
    - b) Deletes data from a table

- c) Deletes an index
- d) Deletes a database
  Answer: b) Deletes data from a table

38. **Write an SQL query to delete all employees with a salary less than 2000**

    DELETE FROM Employees

    WHERE Salary < 2000;

39. **Which command retrieves data from a database?**
    - a) SELECT
    - b) FETCH
    - c) INSERT
    - d) SHOW
      Answer: a) SELECT

40. **Write an SQL query to retrieve the top 3 highest salaries from the Employees table**

    SELECT Salary

    FROM Employees

    ORDER BY Salary DESC

    LIMIT 3;

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6 DCL and TCL Commands (Continued)

41. **What is a SAVEPOINT used for in SQL?**
    - a) Define a point to which a transaction can be rolled back
    - b) Commit changes to the database
    - c) Grant privileges to a user
    - d) Remove a user from the database
      Answer: a) Define a point to which a transaction can be rolled back

42. **Write an SQL query to create a SAVEPOINT named BeforeUpdate**

    SAVEPOINT BeforeUpdate;

43. **What happens if you issue a ROLLBACK command?**
    - a) Commits changes

- b) Undoes changes since the last COMMIT or SAVEPOINT
- c) Deletes a user
- d) Creates a new transaction
  Answer: b) Undoes changes since the last COMMIT or SAVEPOINT

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7 Clauses (Continued)

44. **What is the use of the DISTINCT clause in SQL?**
    - a) Removes duplicate rows in a result set
    - b) Filters rows based on a condition
    - c) Groups rows by a condition
    - d) Joins tables
      Answer: a) Removes duplicate rows in a result set
45. **Write an SQL query to retrieve all unique department IDs from the Employees table**

    SELECT DISTINCT DeptID FROM Employees;

---

8 Functions (Continued)

46. **Which function returns the current date and time in MySQL?**
    - a) CURRENT()
    - b) NOW()
    - c) DATE()
    - d) TIME()
      Answer: b) NOW()
47. **Write an SQL query to find the length of the name 'Alice' using a string function**

    SELECT CHAR_LENGTH('Alice') AS NameLength;
48. **Which aggregate function finds the number of rows in a table?**
    - a) COUNT()
    - b) SUM()
    - c) AVG()
    - d) LENGTH()
      Answer: a) COUNT()

---

9 Joins (Continued)

49. **Which JOIN includes all rows from the left table and the matching rows from the right table?**
    - a) INNER JOIN
    - b) LEFT JOIN
    - c) RIGHT JOIN
    - d) FULL JOIN
      Answer: b) LEFT JOIN
50. **Write an SQL query to retrieve all employees and their department names, including those who do not belong to any department**

    SELECT EmployeesName, DepartmentsDeptName

    FROM Employees

    LEFT JOIN Departments

    ON EmployeesDeptID = DepartmentsID;

---

10 Subqueries and Views (Continued)

51. **What is a correlated subquery?**
    - a) A subquery that executes independently of the outer query
    - b) A subquery that depends on the outer query for its execution
    - c) A subquery that modifies the outer query
    - d) None of the above
      Answer: b) A subquery that depends on the outer query for its execution
52. **Write an SQL query to create a view HighEarningDepartments showing departments with average salaries greater than 5000**

    CREATE VIEW HighEarningDepartments AS

    SELECT DeptID, AVG(Salary) AS AvgSalary

    FROM Employees

    GROUP BY DeptID

    HAVING AVG(Salary) > 5000;

---

11 Group By and Having (Continued)

53. **Write an SQL query to count the number of employees in each department**

```
SELECT DeptID, COUNT(*) AS EmployeeCount
FROM Employees
GROUP BY DeptID;
```

54. **Write an SQL query to find the total salary for departments with more than 5 employees**

```
SELECT DeptID, SUM(Salary) AS TotalSalary
FROM Employees
GROUP BY DeptID
HAVING COUNT(*) > 5;
```

---

12 Stored Procedures (Continued)

55. **Write a stored procedure to retrieve all employees in a specific department based on a parameter DeptName**

```
CREATE PROCEDURE GetEmployeesByDept(IN DeptName VARCHAR(100))
BEGIN
  SELECT EmployeesName
  FROM Employees
  INNER JOIN Departments
  ON EmployeesDeptID = DepartmentsID
  WHERE DepartmentsDeptName = DeptName;
END;
```

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13 Triggers (Continued)

56. **What are triggers commonly used for?**
    - a) Running tasks at scheduled times
    - b) Automatically executing predefined actions on events like insert or update
    - c) Debugging stored procedures

- d) Creating indexes
  Answer: b) Automatically executing predefined actions on events like insert or update

57. **Write a trigger to prevent any salary from being updated to a value less than 1000**

```
CREATE TRIGGER PreventLowSalary
BEFORE UPDATE ON Employees
FOR EACH ROW
BEGIN
  IF NEWSalary < 1000 THEN
    SIGNAL SQLSTATE '45000'
    SET MESSAGE_TEXT = 'Salary cannot be less than 1000';
  END IF;
END;
```

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14 Normalization & Denormalization (Continued)

58. **Which normalization form removes transitive dependencies?**
    - a) 1NF
    - b) 2NF
    - c) 3NF
    - d) BCNF
      Answer: c) 3NF

59. **What is a drawback of denormalization?**
    - a) Increased complexity
    - b) Increased redundancy
    - c) Slower query performance
    - d) Smaller database size
      Answer: b) Increased redundancy

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4 DDL Commands (Advanced)

60. **Which of the following statements is true about constraints in SQL?**
    - a) Constraints can be applied only at the column level
    - b) Constraints ensure data integrity
    - c) Constraints must be unique for each column
    - d) Constraints can only be applied using DML commands
      Answer: b) Constraints ensure data integrity
61. **Write an SQL query to add a NOT NULL constraint to the Name column in the Employees table**

    ALTER TABLE Employees

    MODIFY Name VARCHAR(100) NOT NULL;
62. **Write an SQL query to drop the Salary column from the Employees table**

    ALTER TABLE Employees

    DROP COLUMN Salary;

---

5 DML Commands (Advanced)

63. **Which command is used to merge two tables into one in SQL?**
    - a) INSERT
    - b) UPDATE
    - c) UNION
    - d) MERGE
      Answer: d) MERGE
64. **Write an SQL query to update all employees' salaries, adding a bonus of 500 if their current salary is less than 3000**

    UPDATE Employees

    SET Salary = Salary + 500

    WHERE Salary < 3000;
65. **What happens if you omit the WHERE clause in a DELETE statement?**
    - a) An error is raised
    - b) No rows are deleted

- c) All rows in the table are deleted
- d) Only the first row is deleted
  Answer: c) All rows in the table are deleted

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6 DCL and TCL Commands (Advanced)

66. **What is the main difference between GRANT and REVOKE?**
    - a) GRANT is used to remove privileges, REVOKE is used to assign them
    - b) GRANT assigns privileges, REVOKE removes them
    - c) Both are used for assigning privileges
    - d) Both are used for creating users
      Answer: b) GRANT assigns privileges, REVOKE removes them
67. **Write an SQL query to grant SELECT and UPDATE privileges on the Employees table to user1**

    GRANT SELECT, UPDATE ON Employees TO user1;
68. **Write an SQL query to rollback to a specific SAVEPOINT called BeforeInsert**

    ROLLBACK TO SAVEPOINT BeforeInsert;

---

7 Clauses (Advanced)

69. **Which operator is used to test whether a value exists in a subquery?**
    - a) IN
    - b) EXISTS
    - c) ANY
    - d) ALL
      Answer: b) EXISTS
70. **Write an SQL query to find all employees whose names start with 'A'**

    SELECT * FROM Employees

    WHERE Name LIKE 'A%';
71. **Write an SQL query to retrieve employees with a salary between 2000 and 5000 using the BETWEEN operator**

    SELECT * FROM Employees

    WHERE Salary BETWEEN 2000 AND 5000;

---

8 Functions (Advanced)

72. **Which function calculates the number of days between two dates in MySQL?**
    - a) DATEDIFF()
    - b) DAYS_BETWEEN()
    - c) DATE_DIFF()
    - d) TIMESTAMPDIFF()
      Answer: a) DATEDIFF()
73. **Write an SQL query to concatenate the first name and last name of employees into a single column called FullName**

    SELECT CONCAT(FirstName, ' ', LastName) AS FullName

    FROM Employees;
74. **Write an SQL query to find the maximum salary in the Employees table**

    SELECT MAX(Salary) AS MaxSalary FROM Employees;

---

9 Joins (Advanced)

75. **What is a CROSS JOIN?**
    - a) Returns only matching rows from two tables
    - b) Returns a Cartesian product of two tables
    - c) Joins rows based on foreign keys
    - d) Joins rows based on common values
      Answer: b) Returns a Cartesian product of two tables
76. **Write an SQL query using a FULL OUTER JOIN to retrieve all records from both Employees and Departments**

    SELECT EmployeesName, DepartmentsDeptName

    FROM Employees

    FULL OUTER JOIN Departments

    ON EmployeesDeptID = DepartmentsID;

---

10 Subqueries and Views (Advanced)

77. **What is the difference between a simple subquery and a correlated subquery?**
    - a) A simple subquery does not depend on the outer query; a correlated subquery does
    - b) A simple subquery depends on the outer query; a correlated subquery does not
    - c) Both depend on the outer query
    - d) None of the above
      Answer: a) A simple subquery does not depend on the outer query; a correlated subquery does
78. **Write an SQL query to retrieve employees whose salary is higher than the average salary of all employees**

    SELECT * FROM Employees

    WHERE Salary > (SELECT AVG(Salary) FROM Employees);

---

11 Group By and Having (Advanced)

79. **What is the main difference between WHERE and HAVING clauses?**
    - a) WHERE filters rows, HAVING filters aggregated data
    - b) WHERE filters aggregated data, HAVING filters rows
    - c) Both filter rows
    - d) Both filter aggregated data
      Answer: a) WHERE filters rows, HAVING filters aggregated data
80. **Write an SQL query to find departments with a total salary greater than 10,000**

    SELECT DeptID, SUM(Salary) AS TotalSalary

    FROM Employees

    GROUP BY DeptID

    HAVING SUM(Salary) > 10000;

---

12 Stored Procedures (Advanced)

81. **What is the difference between a function and a procedure in SQL?**
    - a) A function returns a value; a procedure does not

- b) A procedure returns a value; a function does not
- c) Both return values
- d) Neither return values
  Answer: a) A function returns a value; a procedure does not

82. **Write a stored procedure to calculate and return the total salary of a given department based on a parameter DeptID**

```
CREATE PROCEDURE GetTotalSalary(IN DeptID INT, OUT TotalSalary FLOAT)
BEGIN
  SELECT SUM(Salary) INTO TotalSalary
  FROM Employees
  WHERE EmployeesDeptID = DeptID;
END;
```

---

13 Triggers (Advanced)

83. **Write a trigger to automatically insert a record into a log table whenever a new employee is added**

```
CREATE TRIGGER LogNewEmployee
AFTER INSERT ON Employees
FOR EACH ROW
BEGIN
  INSERT INTO EmployeeLog (EmpID, Action, ActionDate)
  VALUES (NEWID, 'INSERT', NOW());
END;
```

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14 Normalization & Denormalization (Advanced)

84. **What is the main goal of normalization?**
    - a) Reduce redundancy and dependency
    - b) Increase redundancy for faster queries
    - c) Simplify query execution

- d) Improve indexing
  Answer: a) Reduce redundancy and dependency

85. **Which normalization form ensures no multivalued attributes?**
    - a) 1NF
    - b) 2NF
    - c) 3NF
    - d) BCNF
      Answer: a) 1NF

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15 Advanced SQL Concepts

86. **What is a partitioned table in SQL?**
    - a) A table split into multiple databases
    - b) A table logically divided into segments for better performance
    - c) A temporary table
    - d) A view of another table
      Answer: b) A table logically divided into segments for better performance

87. **Write an SQL query to create a partitioned table by DeptID**

```
CREATE TABLE Employees_Partitioned (
    ID INT,
    Name VARCHAR(100),
    Salary FLOAT,
    DeptID INT
)
PARTITION BY HASH(DeptID) PARTITIONS 4;
```

SQL 100-question set

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1 Introduction to DBMS and SQL

1. Define DBMS and list its key functions
2. What is SQL? Mention its categories
3. Which of these is a characteristic of DBMS?
4. Define the purpose of a relational database
5. Write an SQL query to create a simple database

2 Installation and Comments in SQL

6. Steps to install MySQL on Windows
7. What is a comment in SQL? Mention its types
8. Write single-line and multi-line comments in SQL

3 RDBMS Terminologies and Keys

9. Define primary key, foreign key, and candidate key
10. Write SQL to define a primary key for a column

4 DDL Commands

11. Purpose of CREATE, ALTER, DROP, and TRUNCATE commands
12. Write SQL queries for each DDL command

5 DML Commands

13. What is the purpose of the INSERT command?
14. Write SQL to insert multiple rows into a table

6 DCL and TCL Commands

15. Define GRANT and REVOKE commands
16. How does ROLLBACK differ from COMMIT?

7 Clauses

17. Explain the WHERE clause with examples
18. How does DISTINCT help in SQL queries?

8 Functions

19. Differentiate between scalar and aggregate functions
20. Write SQL to use COUNT, SUM, and AVG functions

9 Joins

21. Explain INNER JOIN and FULL OUTER JOIN with examples
22. Write SQL to demonstrate CROSS JOIN

10 Subqueries and Views

23. What is a subquery? Write examples for single-row and multiple-row subqueries
24. Write SQL to create, modify, and delete a view

11 Group By and Having

25. What is the purpose of GROUP BY?
26. Write SQL for grouping data and filtering groups using HAVING

12 Stored Procedures

27. What are stored procedures in SQL? Why are they used?
28. Write SQL to create a stored procedure with input and output parameters

13 Triggers

29. Define triggers and their types
30. Write SQL to create a trigger that logs updates to a specific column

14 Normalization and Denormalization

31. List the forms of normalization and their key goals
32. Give an example of 1NF, 2NF, and 3NF

Advanced Topics and Practice (Questions 86–100)

86. Define partitioning in SQL Write an example query
87. What are window functions? Provide examples for ROW_NUMBER and RANK
88. Write SQL to delete duplicate rows from a table
89. Explain CTE (Common Table Expression) with an example
90. Write SQL for recursive CTE
91. Define JSON in SQL Write SQL to query JSON data
92. What is a materialized view? How is it different from a regular view?
93. Explain indexing in SQL and its types
94. Write SQL to create and use a composite index
95. What are the differences between clustered and non-clustered indexes?
96. Define ACID properties with examples in SQL
97. Write SQL to demonstrate a transaction block with multiple operations
98. What are SQL injection attacks? How can they be prevented?
99. Explain the purpose of NoSQL databases and compare them with RDBMS
100. What are the best practices for optimizing SQL queries?