1) Explain various database users
Naive users, application programmers, sophisticated users, Special users.

2) List the different types of attributes with examples.
Simple attributes, Composite attributes, Single valued, Multivalued, Derived, Complex, Key attributes.

3) What is the role of database administrator?
A Database Administrator (DBA) is an individual or person responsible for controlling, maintaining, coordinating, and operating a database management system. Managing, securing, and taking care of the database systems is a prime responsibility.

4)What restrictions are necessary to ensure that view is updatable?
Rules for SQL view to be updatable:
Built on only one table.
No GROUP BY clause.
No HAVING clause.
No aggregate functions.

5) What is an SQL query block?
The basic unit that can be translated into algebraic operators and optimized.

6) List different aggregate functions in SQL.
There are five aggregate functions, which are: MIN, MAX, COUNT, SUM, and AVG.

7) Define Functional Dependencies.
The functional dependency is the relationship between attributes(characteristics) of a table related to each other. It typically exists between the primary key and non-key attribute within a table.

8) What are the phases involved in database development process?
Requirement gathering, conceptual design, logical design, physical design

9) Define PJNF
Fifth normal form (5NF), is also known as project-join normal form (PJNF). It is a level of database normalization designed to reduce redundancy in relational databases.

10) Write the syntax for GRANT command in SQL.
The grant statement is used to confer authorization. The basic form of
this statement is:
grant <privilege list>
on <relation name or view name>
to <user/role list>;

11) Why do we need mappings between schema levels in three schema architecture?
Mapping is used to transform the request and response between various database levels of architecture.

12) Define data independence.
Data independence refers characteristic of being able to modify the schema at one level of the database system without altering the schema at the next higher level.
Its types are: Physical and logical data independence.

13) Mention any three situations where the weak entity will occur.
Weak entity is an entity that does not have a primary key attribute.

Weak entity is dependent on the strong entity.

14) Advantages of views:
Restricting data access – Views provide an additional level of table security by restricting access to a predetermined set of rows and columns of a table.
Hiding data complexity – A view can hide the complexity that exists in a multiple table join.
Simplify commands for the user – Views allows the user to select information from multiple tables without requiring the users to actually know how to perform a join.
Store complex queries – Views can be used to store complex queries.

15) How to create a trigger in SQL?
A trigger is a stored procedure in database which automatically invokes whenever a special event in the database occurs.
create or replace trigger [trigger_name]
[before | after]
{insert | update | delete}
on [table_name]
[for each row]
[trigger_body]

16) Compare candidate key with super key?
SuperKey:

- Super Key is an attribute (or set of attributes) that is used to uniquely identifies all attributes in a relation.
- All super keys can't be candidate keys.
- Super key attributes can contain NULL values.

Candidate key:

- Candidate Key is a subset of a super key.
- But all candidate keys are super keys.
- Candidate key attributes can also contain NULL values.

17) Types of outer join:
Left outer join, right outer join, full outer join

18) What is Join Dependency?
Join decomposition is a further generalization of Multivalued dependencies.
If the join of R1 and R2 over C is equal to relation R, then we can say that a join dependency (JD) exists.

19) How many ways are possible to implement set operations in DBMS?
Types of Set Operation
Union
UnionAll
Intersect
Minus
We can also use in, not in

20) Difference between Conflict and View Serializability and which one is harder to acheive?
Conflict:
Two schedules are said to be conflict equivalent if all the conflicting operations in both the schedule get executed in the same order.
If a schedule is view serializable then it may or may not be conflict serializable

Conflict equivalence can be easily achieved by reordering the operations of two transactions therefore,

View:
Two schedules are said to be view equivalent if the order of initial read, final write and update operations is the same in both the schedules.
If a schedule is conflict serializable then it is also view serializable schedule.
View equivalence is rather difficult to achieve as both transactions should perform similar actions in a similar manner.

21) Write Syntax for REVOKE statement.
REVOKE SYNTAX:
revoke <privilege list>
on <relation name or view name>
from <user/role list>;

22) What is Thrashing?
Thrashing is a condition or a situation when the system is spending a major portion of its time servicing the page faults, but the actual processing done is very negligible.

23) Define View.
Views in SQL are considered as a virtual table. A view also contains rows and columns.
To create the view, we can select the fields from one or more tables present in the database.

24) Difference between Tuple Relational Calculus (TRC) and Domain Relational Calculus (DRC):
TRC:
The Tuple Relational Calculus (TRC) is used to select tuples from a relation.
A tuple relational calculus is a non-procedural query language
The query cannot be expressed using a membership condition.
DRC:
The Domain Relational Calculus (DRC) employs a list of attributes from which to choose based on the condition. It's similar to TRC, but instead of selecting entire tuples, it selects attributes.
The query can be expressed using a membership condition.

25) What are the desirable properties of decomposition
To check for lossless join decomposition using FD set, following conditions must hold: ▪ Att(R1) U Att(R2) = Att(R) , ▪ Att(R1) ∩ Att(R2) ≠ Φ
Att(R1) ∩ Att(R2) = Att(R1) or Att(R2)

26) Give reasons for allowing concurrency
Reasons for using Concurrency control method is DBMS:
To apply Isolation through mutual exclusion between conflicting transactions.
To resolve read-write and write-write conflict issues.
To preserve database consistency through constantly preserving execution obstructions.

27) What is meant by Shadow paging
A variant of shadow copying, called shadow-paging, reduces copying as follows: the scheme uses a page table containing pointers to all pages; the page table itself and all updated pages are copied to a new location

28) What is dangling tuple
A tuple with a foreign key value that does not appear in the referenced relation is said to be a dangling tuple

29) Difference between database schema and database state
Database Schema is the skeletal view or design of the database. It represents the logical view of the database and illustrates on how data is organized and how the relations are associated.
As for the database state it refers to what content the database contains at any particular given moment.

30) Difference between primary key and unique key.
PRIMARY KEY:
Used to serve as a unique identifier for each row in a table.
Cannot accept NULL values.
A Primary key supports auto increment value.
UNIQUE KEY:
Uniquely determines a row which isn't primary key.
Can accepts NULL values.
A unique key does not supports auto increment value.

31) Define empty entity.
an empty entity usually refers to an entity in a database table that has no data or values assigned to any of its attributes. It is also commonly known as an "empty row" or "null row".

32) Define lock
A lock is a data variable which is associated with a data item.

33) Define deadlock.
In a database, a deadlock is a situation in which two or more transactions are waiting for one another to give up locks.

34) Define schedule
A series of operations from one transaction to other is called Schedule.

35) What is Lost update?
If both transactions are allowed to write to the database, the first update written will be overwritten by the second. The result is a lost update

36) Define Timestamp.
Timestamp is a unique identifier created by the DBMS to identify the relative starting time of a transaction.

37) What are the timestamps associated with each data item in DBMS?
WTS(Q): The timestamp of the most recent transaction that successfully executed write(Q).
RTS(Q): The timestamp of the most recent transaction that successfully executed read(Q).

38) What is fully functional dependency.
An attribute is fully functional dependent on another attribute, if it is Functionally Dependent on that attribute and not on any of its proper subset.

39) Write an example schedule where transactions are in deadlock.

T_3	T_4
lock-X(B)	
read(B)	
$B := B - 50$	
write(B)	
	lock-S(A)
	read(A)
	lock-S(B)
lock-X(A)	

40) Write about mandatory access control.
Mandatory Access Control (MAC) is a system to allow or deny access to private information in an organization.

41) Differentiate strict two-phase locking protocol and rigorous two-phase locking.
Strict 2PL is the most restrictive form of 2PL and guarantees serializability, but may lead to decreased concurrency and increased contention for resources. Rigorous 2PL is similar to strict 2PL but allows for increased concurrency, but does not guarantee serializability and can be more difficult to implement.

42) Define instance and schema
Schema refers to the overall description of any given database. Instance basically refers to a collection of data and information that the database stores at any particular moment.

43) Define single-valued and multi-valued attributes.
Single valued attributes consist of a single value for each entity instance and can't store more than one value. Multi-valued attributes can take up and store more than one value at a time for an entity instance from a set of possible values.

44) Define normalization.
Normalization is the process of organizing data in a database.

45) Define statistical database security
Statistical database security system is used to control the access to a statistical database, which is used to provide statistical information or summaries of values based on various criteria.

46) What is E-R model?
ER model in DBMS is the high-level data model. It stands for the Entity-relationship model and is used to represent a logical view of the system from a data perspective.

47) Difference between database schema and database state
Database Schema represent overall design of the database. Database state represent current state of data in database.

48) Define transaction.
Transactions refer to a set of operations that are used for performing a set of logical work.

49) Define System log
The system log (SYSLOG) is a direct access data set that stores messages and commands. It resides in the primary job entry subsystem's spool space.

50) What is virtual table?
A virtual table is a set of columns that have specific names and data types.

51) What is closure?
The Closure Of Functional Dependency means the complete set of all possible attributes that can be functionally derived from given functional dependency using the inference rules known as Armstrong's Rules.

52) What is minimal cover?
A minimal cover is a simplified and reduced version of the given set of functional dependencies.

53) What are overlapping constraints?
Two or more instances of the super class are participating in two or more sub classes then it is called overlapping constraints.

54) What is log and log-based recovery?
Log is a sequence of records. Log-based recovery in DBMS provides the ability to maintain or recover data in case of system failure

55) What are ACID rules?
The ACID properties, in totality, provide a mechanism to ensure the correctness and consistency of a database
A- Atomicity
C-Consistency
I-Isolation
D-Durability

56) Define data, database and DBMS.
Data: Data is a collection of a distinct small unit of information.
Database: A database is an organized collection of structured information, or data, typically stored electronically in a computer system.
DBMS: A database management system (DBMS) is a collection of programs that allow you to create, manage, and operate a database.

57) Define Data model and list its types.
Data models describe how a database's logical structure is represented.
1) Relational Data Model
2) Entity-Relationship Data Model
3) Object-based Data Model
4) Semistructured Data Model

58) Define Metadata.
Metadata in DBMS is characterized as data about data.

59) Define data abstraction and list levels of data abstraction.
Data abstraction in DBMS means hiding unnecessary background details from the end user to make the accessing of data easy and secure.
1. View or external level
2. Logical or conceptual level
3. Internal or physical level.

60) List applications of DBMS
Railway Reservation System, Library Management System, Banking, Education Sector, Credit card exchanges

61) What are the components of storage manager.
1. Authorization and integrity manager
2. Transaction manager
3. File manager
4. Buffer manager

Types of Keys in RDBMS
DDL, DML, DCL, DQL and TCL