Database Management System (DBMS) - Notes

1. Introduction to DBMS
A Database Management System (DBMS) is software that is used to store, manage, and retrieve data efficiently. It acts as an interface between users and the database. DBMS ensures data security, consistency, and integrity.

2. Characteristics of DBMS
• Data Abstraction
• Data Independence
• Efficient Data Access
• Security & Authorization
• Backup & Recovery

3. DBMS Architecture
DBMS generally follows a 3-level architecture:
• External Level: User view of data
• Conceptual Level: Logical structure of database
• Internal Level: Physical storage structure

4. Data Models
Common types of data models include:
• Hierarchical Model
• Network Model
• Relational Model
• Object-Oriented Model

5. Keys in DBMS
• Primary Key
• Candidate Key
• Foreign Key
• Composite Key
• Super Key

6. Normalization
Normalization is the process of organizing data to reduce redundancy and improve integrity.
Normal forms:
• 1NF
• 2NF
• 3NF
• BCNF

7. SQL (Structured Query Language)
SQL is used for interacting with the database.
Types of SQL commands:
• DDL – CREATE, ALTER, DROP
• DML – INSERT, UPDATE, DELETE
• DCL – GRANT, REVOKE
• TCL – COMMIT, ROLLBACK

8. Transactions & ACID Properties
A transaction is a logical unit of work. ACID properties ensure reliability:
• Atomicity
• Consistency

• Isolation
• Durability

9. Indexing
Indexing improves the speed of data retrieval. Types include:
• Primary Index
• Secondary Index
• Clustered Index
• Non-clustered Index

10. DBMS vs RDBMS
RDBMS is an advanced version of DBMS that stores data in tables and supports relationships.

11. Examples of DBMS
• MySQL
• Oracle
• PostgreSQL
• SQL Server
• MongoDB