

Unit I — Introduction to Database Systems

Database Management System | BMB IT 03 / KMBN IT 03

Unit I: Introduction to Database Systems

Exam Blueprint (2022–2025 papers)

Topic	Years asked	Marks
Define Data / Database / DBMS	2022, 2023, 2024, 2025	2
File-oriented system vs Database system	2022, 2025	7 & 10
Three-schema architecture / DBMS structure	2022, 2023	10
Advantages & functionalities of DBMS	2023, 2024	10
Data models (hierarchical, network, relational, OO)	2025	2 & 7
Evolution of database systems	2025	7
Data independence and its types	2024	2
DBMS languages (DDL, DML, DCL, TCL)	2023, 2024	2

YE QUESTION BAAR-BAAR AAYA HAI

"Define Data, Database and DBMS" **chaaron papers** me 2-marker ke roop me aaya hai. Ye free marks hain — teeno definitions ek-ek line me ratt lo.

1. Basic Concepts

DEFINITION - RATTA MAARO

Data — raw, unprocessed, isolated facts and figures having no meaning on their own. *Example:* 1, 2, 3.

DEFINITION - RATTA MAARO

Information — processed, organised and interpreted data that is meaningful and useful for decision making. *Example:* "Ravi scored 78 marks in Statistics on 12-05-2004."

DEFINITION - RATTA MAARO

Database — a shared, integrated collection of logically related data, organised for efficient storage, retrieval, updating and management.

DEFINITION - RATTA MAARO

DBMS — a collection of interrelated data together with a set of programs that allow users to define, create, maintain, manipulate and control access to the database. *Examples:* Oracle, MySQL, SQL Server, PostgreSQL.

1.1 The Data Hierarchy

Bit -> Byte/Character -> Field -> Record -> File -> Database
 (0/1) ('R') (StudentName) (one row) (STUDENT (college DB)
 table)

Level	Meaning	Example
Bit	A binary digit	█
Byte / Character	8 bits = one character	█
Field (Attribute)	Smallest <i>meaningful</i> unit of data	█
Record (Tuple)	Related fields describing one entity	Complete row for Ravi
File (Table / Relation)	Related records of the same type	█ table
Database	Logically related files/tables	College database

Key terms:

- **Entity** — a real-world object about which data is stored (Student, Course)
- **Attribute** — a property of an entity (RollNo, Name)
- **Metadata** — "data about data"; structure description, stored in the **data dictionary / system catalog**
- **Schema** — the overall logical design; **rarely changes**
- **Instance** — the actual data at a particular moment; **changes constantly**

YAHAN 90% STUDENTS GALTİ KARTE HAIN

Schema aur Instance ka farak yaad rakho. **Schema = design** (jaise ek khaali table ka structure). **Instance = us waqt ka actual data** (table ke andar ki rows).

2. Evolution and Need for Database Systems

2.1 Evolution

1. **Manual/paper records** (pre-1960s) — registers, ledgers
2. **File-based systems** (1960s) — each program managed its own files
3. **Hierarchical model** (mid-1960s) — IBM **IMS**, built for the Apollo programme; tree structure
4. **Network model** (late 1960s) — **CODASYL DBTG** standard; graph structure
5. **Relational model** (1970) — **E. F. Codd's** paper; data as simple tables; commercialised in the 1980s (Oracle, DB2). *Still dominant.*
6. **Object-oriented / object-relational** (late 1980s–90s) — for complex data like multimedia and CAD
7. **Data warehousing, OLAP, data mining** (1990s) — analytical not transactional
8. **Web, XML, distributed databases** (2000s)
9. **NoSQL, Big Data, cloud** (2010s) — MongoDB, Cassandra, HBase
10. **NewSQL and AI/vector databases** (present)