Unit II — Data Modelling & Database Design

Database Management System | BMB IT 03 / KMBN IT 03

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Exam Blueprint (2022–2025 papers)

Topic	Years asked	Marks
Normalization — 1NF, 2NF, 3NF, BCNF	2023, 2024, 2025	7 & 10
Keys — primary, candidate, super, foreign	2023, 2024, 2025	2 & 10
ER model → relational schema conversion	2023, 2025	7 & 10
Draw an ER diagram (hospital)	2022, 2025	7 & 10
Generalization, specialization, aggregation	2025	7
Integrity constraints	2025	7
Strong vs weak entity set	2023	10
Functional dependencies — types	2023	2

YE QUESTION BAAR-BAAR AAYA HAI

Normalization har paper me aata hai. Sirf definitions mat ratna — ek unnormalised table ko 1NF → 2NF → 3NF → BCNF tak convert karna practise karo. Section 5 ka worked example exam-ready hai.

1. The Entity-Relationship (ER) Model

DEFINITION - RATTA MAARO

The **ER model** (Peter Chen, 1976) is a high-level conceptual data model that describes the real world as a collection of **entities** and **relationships** among them. Used at the design stage, before converting to a relational schema.

1.1 Entities

DEFINITION - RATTA MAARO

An **entity** is a real-world object, distinguishable from others, about which data is stored. An **entity set** is a collection of entities of the same type.

Type	Description	Notation
Strong entity set	Has its own **primary key**; exists independently	Single rectangle
Weak entity set	**No primary key** of its own; depends on an owner entity. Identified by a **partial (discriminator) key** + owner's key	**Double rectangle + double diamond** identifying relationship

EXAM TIP - AISE LIKHO

Strong vs Weak (2023, 10 marks): classic example (strong) and (weak). Ek dependent ko akele identify nahi kar sakte — uska naam *plus* employee ka ID chahiye. Employee delete karo toh dependents bhi khatam. Weak entity ki participation hamesha **total** hoti hai.

1.2 Attributes

Type	Meaning	Notation	Example
Simple (atomic)	Cannot be divided	Plain ellipse	
Composite	Divisible into sub-parts	Ellipse with sub-ellipses	→ First, Middle, Last
Single-valued	One value only	Plain ellipse	
Multi-valued	Many values	**Double ellipse**	
Derived	Computed, not stored	**Dashed ellipse**	from
Key attribute	Uniquely identifies the entity	**Underlined**	
Partial key	Identifies a weak entity within its owner	**Dashed underline**	

1.3 Relationships and Constraints

DEFINITION - RATTA MAARO

A **relationship** is an association among two or more entities. Represented by a **diamond**.

Degree: *unary* (recursive — Employee *manages* Employee), *binary* (two entities, most common), *ternary* (three).

A. Mapping cardinality:

Type	Meaning	Example
1:1	One in A relates to at most one in B	One Employee heads one Department
1:N	One in A relates to many in B	One Department employs many Employees
N:1	Many in A relate to one in B	Many Employees work in one Department
M:N	Many in A relate to many in B	Many Students enrol in many Courses

B. Participation constraint: