■ MOST IMPORTANT TOPICS TO STUDY FIRST (HIGHLY LIKELY IN EXAM)

Module 1: Introduction to DBMS

Definition & Purpose of DBMS Database vs. File System (advantages of DBMS over file system) Data Models: Hierarchical Network Relational (VERY IMPORTANT) Object-Oriented DBMS Architecture: 1-tier, 2-tier, 3-tier Data Independence: Logical vs. Physical DBA Roles & Responsibilities Entity, Attribute, Domain, Tuple, Relation

Module 2: Relational Model & RDBMS Concepts

Codd's 12 Rules Keys in RDBMS: Primary, Candidate, Super, Foreign, Composite Relational Algebra (VERY LIKELY): Select, Project, Union, Set Difference, Cartesian Product, Rename Relational Calculus (Tuple and Domain) Integrity Constraints: Entity, Referential, Domain Schema vs. Instance

Module 3: SQL (Structured Query Language)

Data Definition Language (DDL): CREATE, DROP, ALTER Data Manipulation Language (DML): SELECT, INSERT, UPDATE, DELETE Data Control Language (DCL): GRANT, REVOKE Basic SQL Queries: SELECT with WHERE, GROUP BY, ORDER BY, HAVING Joins (VERY IMPORTANT): Inner, Left, Right, Full Outer Nested Queries & Subqueries Aggregate Functions: COUNT, SUM, AVG, MIN, MAX Views and Indexes

Module 4: Database Design & ER Model

Entity-Relationship (ER) Model: Entity, Relationship, Attributes ER Diagrams (Symbols: Rectangle, Diamond, Oval, etc.) Cardinality: 1:1, 1:N, M:N Generalization, Specialization, Aggregation Mapping ER Model to Relational Schema

Module 5: Normalization & Functional Dependencies

Functional Dependency (FD) Anomalies in Unnormalized Data (Insertion, Deletion, Update) Normalization: 1NF, 2NF, 3NF, BCNF (VERY IMPORTANT – with examples) Multi-valued Dependency & 4NF (optional, if time permits)

Module 6: Transaction Management & Concurrency Control

ACID Properties Transaction States: Active, Partially Committed, Failed, Aborted, Committed Schedules: Serial, Non-Serial Conflict Serializability (VERY LIKELY) Concurrency Control Techniques: Lock-based Protocols (2PL – Two Phase Locking) Timestamp-based Protocols Deadlock Handling (Detection, Prevention) Recovery Techniques: Log-Based, Checkpointing

BONUS QUICK-SCORE TOPICS (Short Questions)

DBMS vs. RDBMS Difference between DELETE, TRUNCATE, and DROP Candidate Key vs. Primary Key Data Dictionary DDL vs DML vs DCL vs TCL View vs Table SQL vs NoSQL Data Redundancy & Data Integrity Cardinality & Degree NULL vs 0 vs '' (empty string) Trigger, Cursor, Stored Procedure (Definitions)