

## DETAILED SYLLABUS OF DATABASE MANAGEMENT SYSTEM for GATE

### Introductory

- DBMS Syllabus
- Intro to DBMS
- File System vs DBMS
- DBMS architectures
- OLAP vs OLTP
- Schema and three schema Architecture
- What is Data Independence?

### Concept of Keys

- Concept of Keys
- Candidate Keys and Super Keys
- Primary Key and Alternate Keys
- Model Questions on Number of Super Keys
- Foreign Keys
- Referential Key Integrity Constraints
- Functional Dependency
- Attribute Closure
- How to find number of Candidate Keys
- Model Questions on Number of Candidate Keys

## ER Model

- Intro to ER Model
- Types of Attributes
- Relationships in ER diagram
- Cardinality Ratio and Participating Constraints
- One to Many Mapping
- One to One Mapping
- Many to Many Mapping
- Model questions on min number of tables - I
- Self-Referential
- Weak Entity
- Model questions on min number of tables – II

## Normalization

- Canonical Cover
- Equivalence of FDs
- Armstrong Axioms
- Lossless Join Decomposition
- Dependency Preserving Decomposition
- Normalization
- First Normal Form

- Second Normal Form
- Third Normal Form
- Boyce Codd Normal Form
- How to find Normal Form
- Model Question on Highest Normal Form
- Decomposition into Highest Normal Form

## Relational Algebra

- Intro to Relational Algebra
- Selection and Projection Operation
- Cartesian Product or Cross Product
- Union Operator
- Set-Difference Operator
- Rename Operator
- Intersection Operator
- Intro to Joins
- Natural Join
- Conditional Join
- Outer Join
- "More/Less than Some" type of queries
- "More/Less than Every" type of queries
- "Maximum and Minimum" type of queries

- Queries on Set Operation
- Division Operator
- Max and Min number of tuples on Join
- Tuple Relation Calculus
- Model Questions on TRC

## SQL

- Intro to SQL
- Aliases
- Alter v/s Update
- Delete v/s Drop v/s Truncate
- Constraints in SQL
- Aggregate Function
- "Group By" Clause
- "Having" Clause
- "Order By" Clause
- Nested and Correlated Nested Query
- WITH Clause
- ANY & ALL Operators
- IN & NOT IN Operators
- EXISTS and NOT EXIST Operators
- Set Operations

- Model SQL Queries - I
- Model SQL Queries – II
- "Kth MAX and MIN"
- SQL Query implementing Division Operator of RA
- Views

## File Organization

- File Organization
- Indexing //Dense Index and Sparse Indexing
- Primary Indexing
- Clustering Indexing
- Secondary Indexing over Key
- Secondary Indexing over Non Key
- Intro to B Tree
- Construction of B Tree
- Order of B Tree
- Intro to B+ Tree
- Construction of B+ Tree
- Order of B+ Tree
- Min and Max Keys and Nodes in B/B+ Tree
- Bulk Loading in B+ Tree
- Join Algorithms

## Transaction and Concurrency Control

- Transactions
- ACID Properties
- Schedule
- Conflict
- Conflict Equivalent Schedules
- Conflict Serializable Schedule
- View Serializable Schedule
- Concurrency Problems
- Recoverable and Irrecoverable Schedule
- Cascading and Cascadeless Schedule
- Simple Lock based Protocol
- Basic 2PL Locking Protocol
- Model Questions on 2 PL
- 2 PL categories
- Basic Time Stamp Ordering Protocol
- Model Questions on Basic TO Protocol