CSMC 201: Advanced Database Management System

TOPICS	HOURS

Relational Database Design: **8**
Problem Solving on Normalization & Functional Dependency, Multi-valued Dependencies; Indexing: Cost model of basic file Organizations like Heap file, Sorted file, Hashed file, Need of Indexing and Hashing, Tree Structured Indexing: ISAM, B+ Tree; Hash based Indexing: Static, Extendable, Linear Hashing schemes, Index selection guideline with small use cases.

Query Processing and Optimization: **6**
Query Evaluation: External Sorting, Evaluation of relational Operators (Select & Join) including Join algorithms, Query Optimization: Heuristic based & Cost based optimization, Structure of Query Optimizer with small use case. Database tuning through reframing schema, query, view.

Concurrency Control and Recovery: **10**
Transaction & Schedule, ACID property, Serializabilty, Anomalies with Interleaved execution, Conflict & View serializability, Concurrency Control techniques: Locking and Timestamp based protocols, Multi-version and Validation based schemes, Multiple Granularity locking, Deadlock handling, Crash Recovery: ARIES, Recovery Data structure Log, Write Ahead Logging, Check-pointing, Recovery from a system crash.

Alternative Data Models: **6**
Weakness of RDBMS, Contribution of Object & Object Relational Data Model, Semi Structured and Unstructured Data Handling in Database application: XML Document-DTD-XML Schema, XPath- XQuery

Distributed Database: **5**
Architecture, Fragmentation and Allocation Transparency, Basic Concept of Distributed Database Design (through small use cases), Sharding and Replication, CAP Theorem.

No SQL Databases: **5**
Features of various types of No-SQL databases, Brief Concept on Key-value database, Document Store, Column Family Stores and Graph databases.

Books:

1. Avi Silberschatz, Hank Korth, and S. Sudarshan, "Database System Concepts", 6 th Ed. McGraw Hill, 2010.

2. Ramez Elmasri, B.Navathe, "Fundamentals of Database Systems", 7th edition, Addison Wesley,2014

3. Sadalage, P., Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pearson Addision Wesley, 2012

4. Database System Concepts, Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGraw-Hill.