

NIRMA UNIVERSITY
Institute of Technology
M Tech Computer Science and Engineering (Data Science)
Semester – I

L	T	P	C
3	0	2	4

Course Code	6CS203
Course Name	Advanced Database Systems

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. assess various storage and retrieval methods through appropriate indexing
2. design and analyze efficiency of algorithms for database operations
3. comprehend contemporary database architectures and its relevant issues

Syllabus:

Teaching Hours:

Unit I

Data storage: Overview of RDBMS concepts, Basic File Structures, File Organization & Record formats, Heap sorted & Hashed Files, Buffer management, Disk Storage, Parallel Disk access with RAID, Modern Storage Architectures

5

Unit II

Indexing Structures: Single level and Multilevel Indexes, B Tree and B+ Tree Indexes, Hash and bitmap based indexing, Index Structures for Single Dimensional and Multidimensional Databases

8

Unit III

Query Processing: Query Execution, Algebra for Queries, Physical-Query-Plan-Operators, Algorithms for Database Operations, Algorithms for Joins and Sorting, hash and index based algorithms, Buffer Management, Parallel Algorithms for Relational Operators

9

Unit IV

Query Optimization: Algebraic Foundation for Improving Query Plans, Estimating Cost of Operations, Cost Based Plan Selection, Choosing Order of Joins, Optimization of Queries for Parallel, Distributed, Multidimensional and Text Database

8

Unit V

Transactions, Concurrency control and Recovery: Transaction scheduling, serializability, Coping with System Failure, Concurrency Control techniques with locking,

7



timestamp ordering and multiversion, Redo and Undo log based recovery, recovery in multi database systems

Unit VI

8

Advances in database systems: Distributed database systems, fragmentation, replication and allocation techniques, NoSQL based systems: key-value based, document based, column based and Graph databases, Streaming SQL, Introduction to active, temporal, spatial, multimedia and deductive databases

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 5 experiments to be incorporated.

Suggested Readings[^]:

1. RamezElmasri, Shamkant B Navathe, Fundamentals of Database System, Pearson Education
2. Garcia Molina, Ullman, Widom, Data Base System Implementation, Pearson education
3. Raghu Ramakrishnan & Johannes Gehrke, Database Management Systems, McGraw Hill
4. Silberschatz, Korth, Sudarshan, Database System Concepts, McGraw Hill
5. M.TamerOzsu, Patrick Valduriez, S.Sridhar, Principles of Distributed Database Systems, Pearson Education

L=Lecture, T=Tutorial, P=Practical, C=Credit

[^]this is not an exhaustive list

