GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 1

Computer Engineering

Subject Name Advanced Data Structures

Sr.No	Course content
1.	Fundamental Data Structuring problem, Red-Black Tree, Top-Down Splay Trees, Skip List, Deterministic Skip List, Random Skip List, Analysis of random and deterministic skip list.AA-Trees, Teaps, Random Treaps, Analyzing treaps.
2.	Multidimensional Indexes: Applications needing Multiple Dimensions, GIS, Data Cubes, , k-d Trees, Operations on k-d Trees, Adapting K-d Trees for Secondary Storage, Region quad Trees and Z-Ordering, Hash-Like Structures for Multidimensional Data, Grid Files, Operations on Grid Files, Partitioned hash functions, Comparison of Grid Files and Partitioned Hashing, Tree-Like Structures for Multidimensional Data, Multiple key Indexes, Performance of Multiple key indexes, Quad Trees, R-Trees, Operations on R-Trees, concept of R* Tree, SS Tree, SR Tree, Clustered index.
3.	Sorting : Internal sorting algorithms for large Structures, External sorting, Model for external sorting, The simple algorithm, Bitonic merge, Multiway Merge, Polyphase Merge, Replacement Selection.
4.	Priority Queue(Heaps) : Simple implementation, Binary Heap, Applications of Priority Queues, D-Heaps, Leftist Heaps, Skew Heaps, Binomial Queues, Pairing Heaps, Heap with unclustered tree/hash index.
5.	Hashing: Hash Tables, Universal Hash families, Applications of dynamic dictionaries, Constructing universal hash family, Strongly universal hash family, Hashing O(1) search time, Nearly perfect hash family, Achieving bounded query time.
6.	The Disjoint Set ADT: Equivalence Relations, The Dynamic Equivalence Problem, Union Algorithm, Path Compression.
7.	Game Tree Evaluation, The Minmax Principle, Randomness and non-uniformity.
8.	Introduction to text searching algorithms, Search techniques for search Engines.

Reference Books:

1. Data Structures and Algorithms in C by Mark Allen Weiss - Pearson
2. Database System Implementation by J. D. Ullman, Jennifer Widom- Pearson
3. The Design and analysis of computer Algorithms by A. V. Aho, R.Sethi and J. D. Ullman, Pearson.
4. Randomized Algorithms by Rajeev Motwani, Prabhakar Raghavan-Cambridge Univ.
5. Database Management Systems by Ramkrishnan and Gehrke –TMH