II B.Tech - II Semester (17CS403) ADVANCED DATA STRUCTURES

Int. Marks	Ext. Marks	Total Marks	L	Т	Р	С
40	60	100	3	1	-	3
Pre-Requis	ites: Data Stru	ictures				

Course Objectives:

- Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs).
- Analyze the space and time complexity of the algorithms studied in the course.
- Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions.
- Demonstrate an understanding of external memory and external search and sorting algorithms.
- Demonstrate an understanding of simple Entity-Relationship models for databases

UNIT-I: Sorting

External Sorting, Introduction, K-way Merging - Buffer Handling for parallel Operation- Run Generation-Optimal Merging of Runs.

UNIT-II: Hashing

Introduction-Static Hashing- Hash Table- Hash Functions- Secure Hash Function- Overflow Handling-Theoretical Evaluation of Overflow Techniques, Dynamic Hashing- Motivation for Dynamic Hashing -Dynamic Hashing Using Directories- Directory less Dynamic, Hashing

UNIT-III: Priority Queues (Heaps)

Model, Simple Implementation, Binary Heap-Structure Property-Heap-Order Property-Basic Heap Operations- Other Heap Operation, Applications of Priority Queues- The Selection Problem Event Simulation Problem, Binomial Queues- Binomial Queue Structure – Binomial Queue Operation-Implementation of Binomial Queues

UNIT-IV: Efficient Binary Search Trees

Optimal Binary Search Trees, AVL Trees, Red-Black Trees, Definition- Representation of a Red-Black Tree-Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree-Joining Red-Black Trees, Splitting a Red-Black tree.and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application.

UNIT-V: Multiway Search Trees

M-Way Search Trees, Definition and Properties- Searching an M-Way Search Tree, B-Trees, Definition and Properties- Number of Elements in a B-tree- Insertion into B-Tree- Deletion from a B-Tree- B+-Tree Definition- Searching a B+-Tree- Insertion into B+-tree- Deletion from a B+-Tree.

UNIT-VI: Digital Search Structures

Digital Search Trees, Definition- Search, Insert and Delete- Binary tries and Patricia, Binary Tries, Compressed Binary Tries- Patricia, Multiway Tries- Definitions- Searching a TrieSampling Strategies-Insertion into a Trie- Deletion from a Trie- Keys with Different LengthHeight of a Trie- Space Required and Alternative Node Structure- Prefix Search and Applications- Compressed Tries- Compressed Tries With Skip Fields- Compressed Tries With Labeled Edges- Space Required by a Compressed Tries, Tries and Internet Packet Forwarding ,- IP Routing- 1-Bit Tries- Fixed-Stride Tries-Variable-Stride Tries.

Course Outcomes:							
CO-1	Understand external sorting and use parallel buffers to sort elements in disk						
CO-2	Understand concept of hashing and apply it to indexing large tables or data bases.						
CO-3	Understand operations on heap and apply it to merge heaps.						
CO-4	Undrstand and analyze and interpret different balanced search trees like AVL tree, Red-Black Tree and Splay trees.	L3					
CO-5	Understand the operations on different multi-way search trees like B-Tree and B+- Trees.	L3					
CO-6	Understand the operations of digital search structures like tries and patrical and apply them to solve problems.	L3					

CO-PO/PSO Mapping Matrix:

	PO-	PSO-	PSO-	PSO-											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO-1	1	2	3	2	1	-	-	-	-	-	-	-	1	3	-
CO-2	1	3	3	3	1	1	-	-	-	-	I	-	1	3	-
CO-3	1	3	3	3	1	1	-	-	-	-	I	-	1	3	-
CO-4	1	3	3	3	1	1	-	-	-	-	I	-	1	3	-
CO-5	1	2	3	2	1	-	-	-	-	-	-	-	1	3	-
CO-6	1	3	3	3	1	-	-	-	-	-	-	-	1	3	-

Text Books:

1. Data Structures, a Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.

2. Fundamentals of DATA STRUCTURES in C: 2nd ed, , Horowitz , Sahani, Andersonfreed, Universities Press

3. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson

Reference Books:

1. Web : <u>http://lcm.csa.iisc.ernet.in/dsa/dsa.html</u>

2. http://utubersity.com/?page_id=878

3. http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures

4. <u>http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms</u>

5. File Structures : An Object oriented approach with C++, 3rd ed, Michel J Folk, Greg Riccardi, Bill Zoellick

6. C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu & EV Prasad, S Chand, 2010.