B.Tech. CSE - Honors

CSH11	Advanced Data Structures	L	T	P	C
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Course Objectives:

1. To illustrate operations of linear and non-linear data structures.
2. To demonstrate computational problems using suitable data structures.
3. To develop algorithms for text processing applications
4. To provide knowledge on the concepts of computational geometry.

Course Outcomes:

1. Implement hashing techniques.
2. Explain importance of dictionary and skip list ADTs.
3. Implement the operations of AVL, red black, splay and 2-4 trees.
4. Develop applications by using text processing.
5. Explain the concepts of computational geometry.

Course Content:

UNIT I **10 periods**

Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries.
Hashing: Review of Hashing, Hash Functions, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

UNIT II **12 periods**

Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists.
Search Trees: AVL Trees – Update Operations, Splay Trees – Splaying, When to Splay

UNIT III **10 periods**

Bounded-Depth Search Trees - Multi-Way Search Trees, (2, 4) Trees, Red- Black Trees

UNIT IV **13 periods**

Text Processing: String Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, **Text Compression** - The Huffman Coding Algorithm, **Text Similarity Testing** - The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.

Computational Geometry: One Dimensional Range Searching, Two-Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree.

Learning Resources:

Text Books:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004. (Unit I)
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002. (Units II - IV)

Reference Books:

1. A. V. Aho, J. E. Hopcroft, And J. D. Ullman, Data Structures and Algorithms, Pearson Education, First Edition Reprint 2003.
2. R. F. Gilberg, B. A. Forouzan, Data Structures, Second Edition, Thomson India Edition, 2005
3. Jean-Paul Tremblay, Paul g. Sorenson, An Introduction to Data Structures with Applications, Tata Mc Graw hill Edition – Second Edition.
4. Seymour Lipschutz, Theory and Problems of Data Structures, Mc Graw hill Edition

Web References:

1.https://en.wikipedia.org/wiki/Data Structures
2.nptel.ac.in/courses/106103069/
3.www.tutorialspoint.com/cplusplus/cpp_data_structures.htm