

Subject Code: 01CE1301
Subject Name: Data Structure
B.Tech. Year – II

Objective: To implement efficient algorithms and programs it is necessary to organize or structure the data. Understanding of data structures and their related applications are highly needed to build sustainable program.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will be able to

- Recognize the need of data structures in real world problems. (Understand)
- Apply various techniques on Linear and Non-Linear data structures. (Apply)
- Analyse various sorting and searching techniques with applications. (Analyse)
- Evaluate various techniques of hashing and its collision. (Evaluate)

Pre-requisite: Basic fundamentals of C/C++/Java.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term work (TW)	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	Introduction to Data Structures: Data Management concepts, Data types – primitive and non-primitive, Types of Data Structures, Linear & non-linear Data Structures, Abstract Data Types	3
2	Linear Data Structures & their representation: Array: Representation of arrays, sparse matrix and its representation, Storage Structures for arrays, Applications of arrays.	16

	<p>Stack: Stack definitions and concepts, Operations on stacks (push, pop, peep, change), Polish Expressions and their compilation, Tower of Hanoi.</p> <p>Queue: Representation of Queue, operations on Queue (insert, delete), Simple Queue, Circular Queue, Double Ended Queue, Priority Queues, Applications of Queue.</p> <p>Linked List: Linked list Understanding and their Operations, Singly Linked List, Doubly Linked List, Circular Linked List, Circular Doubly Linked, Applications of Linked List.</p>	
3	<p>Nonlinear Data Structure:</p> <p>Graph: Graphs and their understanding, Matrix representations of a given graph, Depth First Search (DFS), Breadth First Search (BFS)</p> <p>Tree: Tree definitions and their concepts, Representation of binary tree, Binary tree traversal methods (Inorder, postorder, preorder), Binary search trees, Method to Convert a general tree to binary tree, Threaded binary tree, Applications of Trees, Balanced tree and its mechanism, AVL tree, Weight Balanced Trees, B Tree and B+ Tree.</p>	15
4	<p>Sorting & Searching techniques:</p> <p>Sorting Concepts and methods: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort</p> <p>Searching Concepts and Methods: Sequential Search, Binary Search</p>	5
5	<p>Hashing and Collision</p> <p>Hashing Concepts and methods. Hash Table Methods-Introduction, Hash Functions, Collision in Hashing, Collision-Resolution Techniques with examples.</p>	3
	Total Hours	42

References:

1. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Tata McGraw Hill 2nd Edition, 2004.
2. Tanenbaum, Data Structures using C & C++, PHI, 2nd Edition 2012.
3. Robert L. Kruse, Data Structures and Program Design in C, PHI, 2nd Edition 1997.
4. Mary E.S. Loomis, Data Management and file processing, PHI, 2009

Suggested Theory distribution:

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
20 %	20 %	25 %	20 %	10 %	5 %

Laboratory work:

Laboratory work will be based on Operation of Linear and Non-Linear Data Structure, Sorting and Searching techniques with 14 experiments to be incorporated that will be considered for evaluation

Instructional Method:

- The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

- Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.
- <https://visualgo.net/en>
- <https://www.cs.usfca.edu/~galles/visualization/Algorithms.html>
- <https://quizlet.com>