2017-2018
DEPARTMENT OF COMPUTER ENGINEERING
B. Tech.

Course Title DATA STRUCTURE AND ALGORITHM

Course Number	**:**	COC2060/CO206
Credits	**:**	4
Course Category	**:**	DC (Departmental Core)
Pre-requisite(s)	**:**	
Contact Hours (L-T-P)	**:**	3-1-0
Type of Course	**:**	Theory

Course Objective

To introduce the concept of data structures including arrays, linked lists, stacks, queues, binary trees, heaps, binary search trees, and graphs etc., and apply these data structures in problem solving. To introduce applications of various data structures and its use in a manner that adds to the efficiency of an algorithm in writing effective programs.

Course Outcome

The student will be able to

1. Learn how the choice of data structures and algorithm design methods impact the performance of programs.
2. Analyze the importance and use of Abstract Data Types (ADTs)
3. Design and implement elementary Data Structures such as arrays, trees, Stacks, Queues, and Hash Tables.
4. Identify algorithms as a pseudo-code to solve some common problems.
5. Explain best, average, and worst-cases of an algorithm using Big-O notation.

Syllabus:

UNIT I : INTRODUCTION
Concept of Data Structures, Basic Terminologies related to data structures, linear and non-linear data structure. Concept and properties of algorithms, How to develop an algorithm, Complexity, Time-Space Tradeoff, Algorithm analysis, Rate of growth: Big Oh notation, other asymptotic notations for complexity of algorithms.

UNIT II: ARRAYS
Arrays, one-dimensional arrays: traversal, selection, searching, insertion and deletion. Sorting: Bubble sort, selection sort, insertion sort, merge sort, quicksort, other sorting methods and their analysis. Multi-dimensional arrays, Representation of arrays in physical memory, Application of arrays.

UNIT III: Abstract Data Types (ADTs)
Abstract Data Types, Stacks, Applications of Stacks - prefix and postfix notations, Queue, Circular Queue, Priority Queue, Deque, Linked Lists, Operations on Linked Lists, Circular linked lists, doubly linked lists, concept of dummy nodes.

UNIT IV: Trees & Graphs
Basic terminologies, Binary Tree, representation and traversal of binary tree; in-order, preorder, and post-order traversal. Different types of binary trees: binary search tree, Heap trees and its application to sorting. Graph, representation and its applications. Other related topics.

Books:

1. Aaron M. Tenenbaum, Langsam "Data Structure using C", Pearson, 2008
2. Lipschutz, "Data structures" Tata McGraw Hill.
3. Goodrich M. Tamassia R., "Data Structures and Algorithms in Java", 3rd ed. Wiley