Course Title: **Data Structures and Algorithms (3 Cr.)**
Course Code: **CACS201**
Year/Semester: **II/III**
Class Load: **6 Hrs. / Week (Theory: 3 Hrs., Practical: 3 Hrs.)**

Course Description

This course includes fundamental concept of data structures such as stack, queue, list, linked list, trees and graph; application of these data structures along with several algorithms.

Course Objectives

The general objective of this course is to provide fundamental concepts of data structures, different algorithms and their implementation.

Course Contents

Unit 1 Introduction to data structure **2 Hrs.**

Definition, Abstract Data Type, Importance of Data structure.

Unit 2 The Stack **3 Hrs.**

Introduction, Stack as an ADT, POP and PUSH Operation, Stack Application: Evaluation of Infix, Postfix, and Prefix Expressions, Conversion of Expression.

Unit 3 Queue **3 Hrs.**

Introduction, Queue as an ADT, Primitive Operations in Queue, Linear and Circular Queue and Their Application, Enqueue and Dequeue, Priority Queue

Unit 4 List **2 Hrs.**

Introduction, Static and Dynamic List Structure, Array Implementation of Lists, Queues as a List

Unit 5 Linked Lists **5 Hrs.**

Introduction, Linked List as an ADT, Dynamic Implementation, Insertion & Deletion of Node To and From a List, Insertion and Deletion After and Before Nodes, Linked Stacks and Queues, Doubly Linked Lists and Its Advantages

Unit 6 Recursion **4 Hrs.**

Introduction, Principle of Recursion, Recursion vs. Iteration, Recursion Example: TOH and Fibonacci Series, Applications of Recursion, Search Tree

Unit 7 Trees **5 Hrs.**

Introduction, Basic Operation in Binary tree, Tree Search and Insertion/Deletion, Binary Tree Traversals (pre-order, post-order and in-order), Tree Height, Level, and Depth, Balanced Trees: AVL Balanced Trees, Balancing Algorithm, The Huffman Algorithm, Game tree, B-Tree