Course Title	**Data Structures and Algorithms**
Course Code	**CC-213**
Credit Hours	3
Category	Computing core
Prerequisite	CC-211: Object Oriented Programming
Co-Requisite	None
Follow-up	CC-311: Operating Systems, DI-326: Artificial Intelligence
Course Description	**Algorithm Specification:** Properties of Algorithm, examples, performance, complexity analysis, measurement, and Big Oh notation. **Abstract data types (ADTs):** Array and Polynomial as an ADT, Sparse Matrices, and Representation of Arrays. **Stack ADT:** Linked lists and array implementations, Expressions, Postfix Notation, and Infix to postfix conversion. **Recursion:** Recursive Definition and Processes, Writing Recursive Programs, analyzing recursive algorithms. **Queue:** The Queue ADT, Linked and array implementations of queues, circular and double ended queue, dequeuer, priority queues. **Self-Referencing Classes**: Dynamic Memory Allocation, garbage collection. **Linked List:** Singly Linked Lists, Circular Lists, Linked Stacks and Queues (Double Ended List), Doubly Linked Lists. **Trees:** Introduction to Trees, Logical construction and traversing of Binary Trees, Implementation of Binary Trees (Insertion and Traversing), Searching and deletion in Binary Trees, Binary Search Tree, Introduction to Balanced and AVL Trees. **Heaps:** Heaps and Heaps as Priority Queues, Double Ended Priority Queue. **Searching:** Linear Search, Binary Search, and Types of Indexing. **Hashing:** Hash Functions, Division, Overflow Handling, Chaining. **B-Trees**, **Generalized List**, etc. **Divide and conquer algorithms**. **Sorting:** selection, insertion, merge, quick, bubble, heap, shell, radix, bucket. **Graphs:** Graph terminology, Adjacency List and Adjacency Matrix and Adjacency list representation of Graph. **Elementary Graph Operations:** Breadth First Search and Depth First Search, Spanning Trees (BFSST, DFSST), topological order, shortest path.
Text Book(s)	1. Ellis Horowitz, Sartaj Sahni, D. Mehta, Fundamentals of Data Structures in C++, 2nd Ed., Computer Science Press, 1995. ISBN 81-7808-792-8. 2. Adam B. Drozdek, Data Structure and Algorithm in C++, 4th Ed., Cengage Learning, ISBN 978-1133608424.
Reference Material	1. D. Samanta, Classic Data Structures, Prentice Hall, 2001, ISBN: 812033731X. 2. Mark Allen Weiss, Data Structure and Algorithms in C++, 3rd Ed., Pearson Education, 2006, ISBN: 978-0321441461. 3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, 2nd Ed, MIT Press, 2001, ISBN 0-07-013151-1. 4. Reference from different books enlisted in reference material will be given as required or lecture notes for reading will be provided.