

Course Code	21CSC201J	Course Name	DATA STRUCTURES AND ALGORITHMS			Course Category	C	PROFESSIONAL CORE					L	T	P	C
													3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	School of Computing	Data Book / Codes / Standards	Nil		

Course Learning Rationale (CLR):		Program Outcomes (PO)												Program Specific Outcomes	
The purpose of learning this course is to:		1	2	3	4	5	6	7	8	9	10	11	12		
CLR-1:	know about searching and sorting techniques used to handle a set of data along with time and space complexity														
CLR-2:	utilize various categories of list structures to develop solutions														
CLR-3:	explore usage of Stack and Queues in processing data for real time applications														
CLR-4:	understand tree structure and its applications														
CLR-5:	utilize hash tables for data storage and use graphs to solve real time problems														
Course Outcomes (CO):		At the end of this course, learners will be able to:													
CO-1:		devise algorithms to arrange the data in required order and retrieve a specific datum in efficient manner	1	2	3	-	-	-	-	-	-	-	3	3	-
CO-2:		determine the type of list structure that could be used for solving a problem and implement it using C programming language	2	3	3	-	-	-	-	-	-	-	3	3	-
CO-3:		devise solutions using linear structures Stack and Queue	2	3	3	-	-	-	-	-	-	-	3	3	-
CO-4:		express proficiency in usage of tree for solving problems	2	3	3	-	-	-	-	-	-	-	3	3	-
CO-5:		implement Hash tables for storing data and algorithms to find shortest path between nodes in a graph	3	2'	3	-	-	-	-	-	-	-	3	3	-

Unit-1 - Introduction	Programming in C - Primitive data types, Structures, Self-referential structures, Pointers and structures, Dynamic memory allocation, Matrix multiplication; Data Structure – Definition, Types, ADT, Operations; Mathematical notations - Big O, Omega and Theta, Complexity – Time, Space, Trade off.	15 Hour
Unit-2 - List Structure	Operations on List ADT – Create, Insert, Search, Delete, Display elements; Implementation of List ADT – Array, Cursor based and Linked; Types – Singly, Doubly, Circular; Applications - Sparse Matrix, Polynomial Arithmetic, Joseph Problem	15 Hour
Unit-3 - Stack and Queue	Operations on Stack ADT – Create, Push, Pop, Top; Implementation of Stack ADT – Array and Linked; Applications - Infix to Postfix Conversion, Postfix Evaluation, Balancing symbols, Function Calls, Tower of Hanoi; Operations on Queue ADT - Create, Enqueue and Dequeue; Implementation of Queue ADT – Array and Linked; Types of Queue - Circular, Double ended and Priority Queue, Applications – Scheduling	15 Hour
Unit-4 - Trees and Hashing	Introduction to Trees, Tree traversals, Complete Binary Tree and its height, Binary Search Trees, Need for Balance, Rotation, AVL trees, B Trees, Heaps, trees and array implementations and applications; Hash functions - Introduction, functions, Collision avoidance, Separate chaining, Open Addressing, Linear Probing, Quadratic probing.	15 Hour
Unit-5 - Graph	Introduction to Graph, Graph Traversal, Topological sorting, Minimum spanning tree – Prim's Algorithm, Kruskal's Algorithm, Shortest Path Algorithm - Dijkstra's Algorithm	15 Hour