CSE2003	DATA STRUCTURES AND ALGORITHMS	L	T	P	J	C
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Pre-requisite	**NIL**	**Syllabus version**				
		v1.0				

Course Objectives:

1. To impart the basic concepts of data structures and algorithms.
2. To assess how the choice of data structures and algorithm design methods impacts the performance of programs.
3. To provide an insight into the intrinsic nature of the problem and to develop software systems of varying complexity.

Expected Course Outcome:

1. Evaluating and providing suitable techniques for solving a problem using basic properties of Data Structures.
2. Analyse the performance of algorithms using asymptotic notations.
3. Demonstrate knowledge of basic data structures and legal operations on them.
4. Illustrate different types of algorithmic approaches to problem solving and assess the trade-offs involved.
5. Analyse basic graph algorithms, operations and applications through a structured (well-defined) algorithmic approach.
6. Categorize the feasibility and limitations of solutions to real-world problems.
7. Provide efficient algorithmic solution to real-world problems.

Module:1	**Introduction to Data structures and Algorithms**	**1 hour**

Overview and importance of algorithms and data structures, Stages of algorithm development for solving a problem: Describing the problem, Identifying a suitable technique, Design of an Algorithm, Proof of Correctness of the Algorithm, Computing the time complexity of the Algorithm.

Module:2	**Analysis of Algorithms**	**3 hours**

Asymptotic notations and their significance, Running time of an algorithm, Time-complexity of an algorithm, Performance analysis of an algorithm, Analysis of iterative and recursive algorithms, Master theorem (without proof).

Module:3	**Data Structures**	**7 hours**

Importance of data structures, Arrays, Stacks, Queues, Linked list, Trees, Hashing table, Binary Search Tree, Heaps.

Module:4	**Algorithm Design Paradigms**	**8 hours**

Divide and Conquer, Brute force, Greedy, Recursive Backtracking and Dynamic programming.

Module:5	**Graph Algorithms**	**4 hours**

Breadth First Search (BFS), Depth First Search (DFS), Minimum Spanning Tree (MST), Single Source Shortest Paths.

Module:6	**Computational Complexity classes**	**5 hours**

Tractable and Intractable Problems, Decidable and Undecidable problems, Computational complexity Classes: P, NP and NP complete - Cooks Theorem (without proof),3-CNF-SAT Problem, Reduction of 3-CNF-SAT to Clique Problem, Reduction of 3-CNF-SAT to Subset sum problem.

Module:7	**Recent Trends**	**2 hours**

Algorithms related to Search Engines