

Course Code:	ECSE701L	Semester : 1 Year : 1	Credit Hours:	3-0-2
Course Title :	ADVANCED DATA STRUCTURES AND ALGORITHMS	Pre-requisite:	NIL	
Course Objectives	<p><i>Objectives of the course are:</i></p> <p>To learn the advanced concepts of data structure and algorithms and its implementation.</p>			
Course Contents :	Topics			L-T-P
	Advanced Data Structures: Importance and need of good data structures and algorithms Heaps, AVL Trees (Search, Insertion, Deletion) Red-Black Trees(Search, Insertion and Deletion)			3
	Splay Trees(Search, Insertion and Deletion),B-trees, B+ Trees (Search, Insertion and Deletion)			3
	Fibonacci heaps, Data Structures for Disjoint Sets, Augmented Data Structures, Self-Adjusting Data Structures, Temporal data structures, Succinct data structures, Dictionaries and cuckoo hashing.			3
	Algorithms Complexity and Analysis: Probabilistic Analysis with example, Amortized Analysis with example, Competitive Analysis with example, Internal and External Sorting algorithms like external merge sort, distribution sorts.			3
	Representation, Type of Graphs, Paths and Circuits: Euler Graphs, Hamiltonian Paths & Circuits; Cut-sets, Connectivity and Separability, Planar Graphs, Isomorphism,			3
	Graphs & Algorithms: Graph Coloring, Covering and Partitioning, Topological sort, Max flow: Ford-Fulkerson algorithm, max flow – min cut, Dynamic Graphs, Few Algorithms for Dynamic Graphs, Union-Find Algorithms.			3
	String Matching Algorithms: Suffix arrays, Suffix trees, tries, Rabin-Karp, Knuth-Morris-Pratt, Boyer Moore algorithm.			3
	Approximation algorithms: Need of approximation algorithms: Introduction to P, NP-Hard and NP-Complete;			3
	Deterministic, non-Deterministic Polynomial time algorithms; Knapsack, TSP, Set Cover, Open Problems			3
	Randomized algorithms: Introduction, Type of Randomized Algorithms, Quick Sort, Min-Cut, 2-SAT; Game Theoretic Techniques, Random Walks.			3
	Online Algorithms: Introduction, Online Paging Problem, Adversary Models, k-server Problem.			3

	Genetic Algorithm: Introduction to GA, implementation in Python, problem solving using GA such as subset problem, TSP, Knapsack.	3
	Advance Data Structure in Python: List, Tuple, Dictionary, Set, Stack.	3
References	<ol style="list-style-type: none"> 1. Sahni, Sartaj, Data Structures, Algorithms and Applications in C++, MIT Press (2005). 2. Thomas Coremen. “Introduction to Algorithms”, PHI (2009), 3rd ed. 3. David E. Goldberg, Genetic Algorithm, Pearson education (2005), 3rd ed. 4. ALGORITHMS by ROGER SEDGEWICK and KEVIN WAYNE, 4th Ed. 	
Special Instructions (if any)		