DATA STRUCTURES AND ALGORITHMS

Course Code	20ES1502	Year	III	Semester	I
Course Category	ES	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Understand the basic concepts of algorithms, time and space complexities, recursion and data structure	L2
CO2	Apply a suitable data structure to solve a given problem	L3
CO3	Apply algorithm design technique to construct one for a given problem	L3
CO4	Analyse the given problem and use a suitable data structure to provide a feasible solution	L4
CO5	Analyse the given problem and use suitable algorithm techniques to provide a feasible solution	L4

Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)

Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation

* - Average value indicates course correlation strength with mapped PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	2				2							2	2	
CO2	2				2								2	
CO3	2		2		2								2	
CO4		3			3								3	
CO5		2			2								2	
Average* (Rounded to nearest integer)	**2**	**3**	**2**		**2**							**2**	**2**	

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Introduction to algorithms**: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving. Algorithm Specification, Asymptotic Notations, and Basic Efficiency Classes. **Introduction to data structures**: Linear - Introduction to linked list. Singly-linked list, Singly Circular linked list, and doubly linked list. Time and space complexity of operations.	CO1,CO2 CO4
II	**Stacks, Queue**: Definition, operations: array implementation of stack and queue, Circular Queue. Time and space complexity of operations.	CO1,CO2 CO4
III	**Trees**: Introduction- Terminology, representation of trees. Binary tree traversal - in order, preorder, post order. Time and space complexity of	CO1,CO2 CO4

	operations. Binary search trees - Definition, searching BST, insert into BST, delete from a BST, Height of a BST. **Graph**: Adjacency matrix and list representation, BFS and DFS traversal. Time and space complexity of operations.	
IV	**Divide and Conquer**: Binary search, Merge sort, Quick Sort. **Greedy Method:** Fractional knapsack problem, Single Source Shortest path (Dijkstra's). Time and space complexities the problems.	CO1,CO3 CO5
V	**Dynamic Programming**: 0/1 Knapsack problem, All-pairs shortest paths, Travelling salesman problem. Time and space complexities of the problems.	CO1,CO3 CO5

Learning Resources
Textbooks
1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Ed., 2002, Pearson. 2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, 3rd Ed., 2010, PHI
References
1. T. H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford - Introduction to Algorithms, Stein, 3rd Ed., 2012, MIT Press. 2. Ellis Horowitz, Sartaj Sahni, S. Rajasekharan - Fundamentals of computer algorithms, 2nd Ed., 2008, Universities Press 3. Horowitz, Sahani, Anderson-Freed - Fundamental of Data Structures in C, 2nd Ed., 2008, Universities Press. 4. Debasis Samantha, Classic Data Structures, 2nd Ed., 2009, PHI. 5. Narasimha K - Data Structures and Algorithms Made Easy by 2020., Career Monk Publication 6. A. Levitin - Introduction to the Design & Analysis of Algorithms, 3rd Ed., 2011, Pearson Education.
e-Resources & other digital material
1. https://www.geeksforgeeks.org/data-structures/ 2. https://www.youtube.com/watch?v=0IAPZzGSbME 3. https://www.cs.usfca.edu/~galles/visualization/Algorithms.html 5. https://www.geeksforgeeks.org/fundamentals-of-algorithms/