Data Structures

Course Code	20ES1305	Year	II	Semester	I
Course Category	ES	Branch	CSE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Programming for Problem Solving
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 algorithm complexities, recursion and data structures.	L2
CO2	Apply suitable searching, sorting algorithms for various applications.	L3
CO3	Apply suitable data structure to solve the problems.	L3
CO4	Analyze the problem to construct an algorithm using suitable data structure.	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	1									1				
CO3												1	3	
CO4		3							1	1				

Syllabus		
Unit No	**Contents**	**Mapped CO**
I	**Introduction:** Algorithm Specification, Time complexity & space complexity and their notations. **Recursion:** What is Recursion, Why Recursion, Format of a Recursive function, Recursion and memory, Recursion Vs. Iteration, Examples **Sorting and Searching:** Searching- Linear and Binary search algorithms, Sorting- Bubble, Insertion, Selection, Merge, Quick sort algorithms.	**CO1,CO2**
II	**Linked lists:** Single linked list, double linked list, circular linked list, and operations on linked lists.	**CO1,CO3,CO4**
III	**Stacks:** Definition, operations: array implementation, linked list implementation and applications. **Queues:** Definition, operations: array implementation, linked list implementation and applications, Circular Queue.	**CO1,CO3,CO4**
IV	**Trees:** Introduction- Terminology, representation of trees, binary trees abstract data type, Properties of binary trees, binary tree representation, binary tree traversals In order, preorder, post order, Binary search trees Definition, searching BST, insert into BST, delete from a BST, Height of a BST.	**CO1,CO3,CO4**
V	**Graphs:** The Graph ADT Introduction, definition, graph representation, elementary graph operations BFS, DFS, Minimum Spanning Tree – only: Prim's and Kruskal's MST.	**CO1,CO3,CO4**

Learning Resources

Text Books

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, 2002, Pearson.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2010, PHI.
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, CareerMonk Publications.

References

1. Fundamental of Data Structures in C, Horowitz, Sahani, Anderson-Freed, Second Edition, 2008, Universities Press.
2. Classic Data Structures, Debasis Samantha, Second Edition, 2009, PHI.

e-Resources & other digital material

1. http://cse.iitkgp.ac.in/pds/
2. http://cmpe.emu.edu.tr/bayram/courses/231/LectureNotesSlides/IQBAL/Lecture%20Notes
3. https://www.geeksforgeeks.org/data-structures/
4. https://www.programiz.com/dsa
5. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
6. https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F
7. https://www.youtube.com/watch?v=S47aSEqm_0I&list=PLgj_V-ZKxRKrxgFyOutPJpoLFBaQMOpK-