Semester	**3**	
Course	**Core**	
Paper Code	**C2DS250312T / C2DS250312P**	
Paper Title	**Data Structure and Analysis of Algorithms**	
No. of Credits	**4**	
Theory/Composite/ Practical	**Composite**	
No. of Classes per week	**Theory: 3, Practical: 2**	
Minimum no. of preparatory hours per week a student has to devote	**4**	
Number of Module	**1**	
Syllabus	**Unit 1:** Introduction to Data structures: Abstract data types, Arrays, Linked Lists, Stack, Queues, Circular Queues. (8) **Unit 2:** Introduction to Algorithms: Algorithms design principles, Analysing Algorithms – Time and space complexity, Iterative and recursive algorithms, Asymptotic notations and their significance. (4) **Unit 3:** Trees: Binary trees, Traversal techniques, Binary search trees, Hashing, Concept of Heap. (8) **Unit 4:** Searching and Sorting: Linear search, Binary search, Bubble sort, Insertion sort, selection sort, Merge sort, Quick sort, Worst and average computing complexity, Median and order statistics. (10) **Unit 5:** Algorithm Design Paradigms: Divide and conquer, Greedy, Dynamic programming and Backtracking with suitable examples. (5) **Unit 6:** Computational Complexity classes: Introduction to NP-completeness, P class, NP-hard class, NP complete class. (4)	
Learning Outcomes	1.Use the fundamental data types for computing (lists, stacks, queues, binary trees, etc.). 2. Properly use and select data structures from language-provided data-structure libraries. 3. Understand basic algorithm analysis. 4. Understand how recursion works and write programs using recursion to solve problems. 5. Make informed decisions about which sorting and searching algorithms to use in specific circumstances. 6. Be able to implement a program using an algorithm and appropriate data structure.	
PRACTICAL	Based on theory topics using Python	
Reading/Reference List	1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", MIT Press, 3rd Edition, 2009. 2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Computer Algorithms", Silicon Press Publications, 2 nd Edition, 2008. 3. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, "Fundamentals of Data Structures using C+ +", 2 nd Edition, Universities Press, 2008. 4. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson, 1 st Edition, 2006 5. S.Sridhar, "Design and Analysis of Algorithms", Oxford University Press, 2015	
Evaluation	Theory CIA: 15 Sem Exam: 45	Practical CA: 40 Sem Exam: NA
Paper Structure for theory Sem Exam	Short questions (5 marks each)	Long questions (15 marks each)
	3 out of 5	2 out of 3