

Course Code	Course Title	L	T	P	C
PSTS601L	Advanced Competitive Coding	3	0	0	3
Pre-requisite	NIL	Syllabus version			
		1.0			
Course Objectives					
1. To understand the basic concepts of data structures and algorithm. 2. To develop the step by step approach in solving problems with the help programming techniques of data structures. 3. To deploy algorithms in real time applications.					
Course Outcome					
At the end of the course the student should be able to 1. Provide a basic understanding of core Java concepts 2. Use linear and non-linear data structures to solve practical problems. 3. Identify Bitwise algorithms for solving real world problems. 4. Illustrate various techniques for searching, sorting and hashing 5. Understand and implement Dynamic Programming. 6. Design new algorithms or modify existing algorithms for new application.					
Module:1	Algorithms	6 hours			
Java Introduction, Features, Structure, Data Types, Basic I/O Operators, Decision making and Control structure, Time & Space complexity					
Module:2	Math based problems and Bitwise algorithms	6 hours			
Simple Sieve, Segmented & Incremental Sieve, Euler's phi Algorithm, Strobogrammatic Number, Remainder Theorem, Toggle the switch & Alice Apple tree, Binary Palindrome, Booth's Algorithm, Euclid's Algorithm, Karatsuba Algorithm, Longest Sequence of 1 after flipping a bit Swap two nibbles in a byte.					
Module:3	Arrays , Searching, Sorting and Strings	6 hours			
Block Swap Algorithm , Max product subarray, Maximum sum of hour glass in matrix ,Max Equilibrium Sum ,Leaders in array, Majority element, Lexicographically first palindromic string, Natural Sort order , Weightes substring ,Move hyphen to beginning, Manacher's Algorithm					
Module:4	Recursion, Back tracking, Greedy Algorithm	6 hours			
Sorted Unique Permutation, Maneuvering, Combination, Josephus trap, Maze Solving, N Queens Problem, Warnsdorff's Algorithm, Hamiltonian Cycle, Kruskal's Algorithm ,Activity Selection Problem, Graph Coloring, Huffman Coding					
Module:5	Dynamic Programming	6 hours			
Longest Common Subsequence ,Longest Increasing Subsequence , Longest Bitonic Subsequence ,Longest Palindromic Subsequence ,Subset sum problem ,0-1 Knapsack, Traveling Salesman, Coin Change, Shortest Common, Supersequence, Levenshtein Distance problem, Rod Cutting problem, Wildcard pattern matching , Pots of gold game					
Module:6	Linked list, Stack, Queue	6 hours			
Loop Detection, Sort the bitonic DLL, Segregate even & odd nodes in a LL , Merge sort for DLL ,Minimum Stack, The Celebrity problem, Iterative Tower of Hanoi Stock					

Span problem, Priority Queue using DLL, Sort without extra Space, Max Sliding Window, Stack permutations			
Module:7	Trees, Graphs , Heaps, Maps		6 hours
Recover the BST, Views of tree Vertical order traversal ,Boundary traversal, BFS, DFS, Dial's Algorithm ,Bellman-Ford Algorithm, Topological Sort ,Heap Sort Binomial heap, K-array heap, Winner tree, Hash Map to Tree Map.			
Module:8	Interview Preparation		3 hours
Networking, Security, Operating Systems, Data Base Management Systems.			
Total Lecture hours			45 hours
Text Book			
1.	Mark Allen Weiss, "Data structures and algorithm analysis in C++", 2019, 4th Edition, Pearson Education.		
Reference Books			
1.	J.P. Tremblay and P.G. Sorenson, "An Introduction to Data Structures with applications", 2017, Second Edition, Tata Mc Graw Hill.		
2.	Richard M. Reese, Jennifer L. Reese, Alexey Grigorev, Java: Data Science Made Easy, 2019 Pocket Publishing.		
Mode of Evaluation: CAT, Written assignment, Quiz, Project & FAT.			
Recommended by Board of Studies		24-02-2023	
Approved by Academic Council		No. 70	Date 24-06-2023