TEACHING PLAN: B.TECH. (CSE) SEMESTER – 4TH

SCHOOL OF ENGINEERING & TECHNOLOGY		ACADEMIC SESSION: 2022-23		FOR STUDENTS' BATCH: 2021-25	
1	Course Code	PCC-CSE-212			
2	Course Title	Design & Analysis of Algorithm			
3	Credits	03			
4	Learning Hours	Contact Hours	04		
		Practical Teaching	00		
		Project, Tutorial & Assessment	00		
		Total Hours	04		
5	Course Objective	1. To introduce methods of algorithm. 2. To design algorithm based on different modules. 3. To visualize the dependencies between algorithm & software development.			
6	Course Outcomes	1. Students will be introduced with algorithm. 2. Students will learn to design algorithms. 3. Students will learn to implement algorithm for coding.			
7	Outline Syllabus				
7.01	Paper Code	Unit	Introduction	Reference Number	Teaching Method
	PCC-CSE-301	(I)	**MATHEMATICAL FOUNDATION:** summation of arithmetic and geometric series, n, n2, bounding summations using integration, recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions, Complexity calculation of various standard functions, principles of designing algorithms.		Whiteboard, PPT slides, Tutorials, Demonstration
		(II)	**ASYMPTOTIC NOTATIONS:** Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, amortized analysis, application of motorized analysis, Sorting networks, comparison networks, biotonic sorting network.		Whiteboard, PPT slides, Tutorials, Demonstration
		(III)	**ADVANCED DATA STRUCTURES:** Advanced data structures like Fibonacci heap, Binomial heap, disjoint set representation, red and black trees and their applications. Divide and conquer basic strategy, matrix operation, binary search, quick sort, merge sort ,fast fourier transform.		Whiteboard, PPT slides, Tutorials, Demonstration
		(IV)	**GREEDY METHODS & DYNAMIC PROGRAMMING:** Greedy method – basic strategy, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path etc. Dynamic Programming basic strategy, multistage graphs, all pairs shortest path, single source shortest paths, optimal binary search trees, traveling salesman problem, Maximum flow networks.		Whiteboard, PPT slides, Tutorials, Demonstration
		(V)	**TRAVERSAL & SEARCH TECHNIQUES:** Basic Traversal and Search Techniques, breadth first search and depth first search, connected components. Backtracking basic strategy, 8-		Whiteboard, PPT slides, Tutorials, Demonstration

			Queen‟s problem, graph colouring, Hamiltonian cycles.		
		(VI)	**COMPLETENESS PROBLEM & APPLICATIONS:** NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP complete, decision and optimization problems, Computational Geometry, Approximation algorithm and concepts based on approximation algorithms.		Whiteboard, PPT slides, Tutorials, Demonstration

8	**Course Evaluation**	
8.10	**CA: 20%**	
8.11	**Attendance**	5%
8.12	**Assignment**	10%
8.13	**Quizzes**	-
8.14	**Projects**	-
8.15	**Presentation**	5% (2 Presentations)
8.16	**Any Other**	-
8.2	**Mid-Term Exam. (Internal Assessment)**	20%
8.3	**End-Term Examination**	60%
9	**Textbooks & References**	
9.1	**Textbooks**	**1.** Thomas H. Cormen et. al. “Introduction to Algorithms”, Prentice Hall of India. **2.** Design & Analysis of Computer Algorithms by Aho,. Horowitz, Sahani, Rajsekharam, Pearson education.
9.2	**Reference Books**	**1.** “Computer Algorithms”, Galgotia Publications Pvt. Ltd. Brassard, Bratley, “Fundamentals of Algorithms”, Prentice Hall. **2.** Computer Algorithms: Introduction to Design and analysis, 3rd Edition, By Sara Baase & A. V. Gelder Pearson Education.
9.3	**Video References**	**1.** https://www.youtube.com/watch?v=gY0MwGLq9W8&list=PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639_P&ab_channel=DesignandAnalysisofAlgorithms **2.** Design and Analysis of Algorithm | Fibonacci Heap: Definition, Properties and its Operations Part-1 - YouTube **3.** Design and Analysis of Algorithms Introduction to Red-Black Tree | AKTU Digital Education - YouTube

Mapping of Outcomes Vs. Topics

Course Outcomes	Program Outcome												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	2	3	1	2	1		2	2	1	2	3	3	2	2
CO2	3	3	3	3	2	2	1		1	1	1	1	3	3	2	2
CO3	3	3	3	3	3	2	2		2	2	2	2	3	3	2	2
CO4	3	3	3	3	3	2	2		2	1	1	1	3	2	2	1
CO5	3	2	1	1	3	3	2		1	1	1	2	3	2	3	2