



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
IT41	Design and Analysis of Algorithms	3	-	-	3	-	-	3
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60%weightage)		

<b>Pre-requisite Course Codes</b>	ES4 (Programming Methodology and Data structures)
After successful completion of the course, student will be able to	
<b>Course Outcomes</b>	CO1 Analyze time and space complexity of an algorithm
	CO2 Apply divide and conquer strategy to solve problems
	CO3 Design an algorithm to illustrate the concept of dynamic programming
	CO4 Apply the concept of greedy approach to solve problems
	CO5 Apply backtracking, branch and bound strategy and string matching algorithms to solve some problems.
	CO6 Apply the concept of linear programming to optimize the solution

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	<b>Introduction to analysis of algorithm</b> Performance analysis , space and time complexity Growth of function – Big –Oh ,Omega , Theta notation Mathematical background for algorithm analysis, Analysis of selection sort, insertion sort.	1,2,3	10
	1.2	<b>Recurrences:</b> The substitution method Recursion tree method Master method	1	
	1.3	<b>Divide and Conquer Approach:</b> General method Analysis of Merge sort, Analysis of Quick sort, Analysis of Binary search, Finding minimum and maximum algorithm and analysis, Strassen's matrix multiplication.	1,5	
2	2.1	<b>Dynamic Programming Approach:</b> General Method Assembly-line scheduling 0/1 knapsack Travelling salesman problem Longest common subsequence	1,2,3	12
	2.2	<b>Greedy Method Approach:</b> General Method	1,2,3	



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		Single source shortest path Knapsack problem Minimum cost spanning trees-Kruskal and prim's algorithm Hamming code Algorithm		
<b>3</b>		<b>Backtracking and Branch-and-bound:</b> General Method 8 queen problem( N-queen problem) Sum of subsets Graph coloring 15 puzzle problem, Travelling salesman problem.	1,4	06
<b>4</b>		<b>Linear Programming</b> Standard and slack forms Formulating problems as linear problems The simplex algorithm Duality The initial basic feasible solution	1	08
<b>5</b>		<b>String Matching Algorithms:</b> The naïve string matching Algorithms The Rabin Karp algorithm String matching with finite automata The knuth-Morris-Pratt algorithm	1,5	06
			<b>Total</b>	<b>42</b>

## References:

1. T.H .Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, “*Introduction to algorithms*”, 3<sup>rd</sup> edition, PHI publication 2009.
2. Ellis Horowitz, Sartaj Sahni, S. Rajasekaran. “*computer algorithms*” 2<sup>nd</sup> edition, Computer Science Press, 1997
3. Sanjoy Dasgupta, Christos H. Papadimitriou, Umesh Vazirani, “*Algorithms*”, 1<sup>st</sup> edition, Tata McGraw- Hill, 2006.
4. Jon Kleinberg, Eva Tardos, “*Algorithm Design*”, 1<sup>st</sup> edition, Pearson, 2006.
5. Michael T. Goodrich, Roberto Tamassia, “*Algorithm Design and Application*”, 1<sup>st</sup> edition ,Wiley Publication, 2015.