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
CPE7021	Elective-IIAdvanced Algorithms	4	-	-	4	-	-	4
		Examination Scheme						
		ISE		MSE	ESE			
		10		30	100 (60% Weightage)			

Pre-requisite Course Codes		CSC303 (Data Structure) CSC402 (Analysis of Algorithm)
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Able to design algorithms and employ appropriate advanced data structures for solving computing problems efficiently;
	CO2	Able to analyze the various algorithms from different domains
	CO3	Have an idea of applications of algorithms in a variety of areas, including linear programming, computational geometry and maximum flow.
	CO4	To understand the role of Optimization by using linear programing.

Module No.	Topics	Ref.	Hrs.
1	**Introduction** 1.1 Asymptotic notations Big O, Big Θ,,Big Ω,ο,ωnotations ,Proofs of master theorem, applyingtheorem to solve problems	1,2	**03**
2	**Advanced Data Structures** 2.1 Red-Black Trees: properties of red-black trees , Insertions , Deletions 2.2 B-Trees and its operations 2.3Binomial Heaps: Binomial trees and binomial heaps, Operation on Binomial heaps	1,2	**09**
3	**Dynamic Programing** 3.1 matrix chain multiplication, cutting rod problem and its analysis	1,2	**06**
4	**Graph algorithms** 4.1 Bellman ford algorithm, Dijkstra algorithm, Johnson's All pairshortest path algorithm for sparse graphs	1,2	**06**
5	**Maximum Flow** 5.1 Flow networks , the ford Fulkerson method ,max bipartitematching , push Relabel Algorithm , The relabel to frontalgorithm	1,2	**08**
6	**Linear Programing** 6.1Standard and slack forms, Formulating problems as linearprograms, simplex algorithm, Duality, Initial basic feasiblesolution	1,2	**08**
7	**Computational Geometry**	1,2	**08**

	7.1 Line Segment properties, Determining whether any pair ofsegment intersects, finding the convex hull, Finding the closestpair of points.		
		Total	**48**

References:

[1] T.H. Coreman , C.E. Leiserson, R.L. Rivest, and C. Stein, "Introduction to algorithms",2nd edition , PHI publication 2005

[2] Ellis Horowitz ,SartajSahni , S. Rajsekaran. "Fundamentals of computer algorithms" University press