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
IT31	Advanced Data Structures	3	-	-	3	-	-	3
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60%weightage)		

Pre-requisite Course Codes		ES4 (Programming Methodology and Data Structures)
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Implement various operations using non linear data structures.
	CO2	Apply concepts of Trees and Graphs to a given problem.
	CO3	Build various Heap Structure
	CO4	Illustrate the hashing and collision resolution techniques.

Module No.	Unit No.	Topics	Ref.	Hrs.
1		**Linear and Non-linear Data Structures** Introduction to Data Structures (Stack, Queue and Singly Linked List), Circular Linked List, Doubly Linked List, Application of Linked List.	1,2	05
2	2.1	**Trees** Binary Tree Terminology, Binary Search Tree and its operations, Binary Tree Traversal, Expression Tree	1,2	04
	2.2	AVL Trees- Properties of AVL trees, Rotations, Insertion, and Deletion	1,2	03
	2.3	B-Trees- Definition of B-trees, Basic operation of B-Trees, Deleting a key from B-Trees	1,2	04
	2.4	Introduction to B+ Trees	1,2	03
	2.5	Introduction to Multidimensional Trees, Segment trees, k-d trees, Point Quad trees	3	05
3		**Graph** Introduction To Graph, Representation of Graph- Adjacency Matrix, Adjacency List, Graph Traversal Technique	1,2	04
4	4.1	**Heap Structure** Introduction to Heap Structures, Min Heap, Max Heap, Construction of Heap	2	04

	4.2	Fibonacci heaps- Structure of Fibonacci heaps, Mergeable-heap, operations, Decreasing a key and deleting a node	2	06
5		**Hashing** Introduction to Hash Table, Hash functions, Collision Resolution Technique	1,2	04
			Total	**42**

References:

1. Thomas H.Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, "*Introduction to Algorithms"*, 3rd edition, MIT Press, Massachusetts, 2009.

2. Horowitz E, Sahni S and S.Rajasekaran, "*Fundamentals of Computer Algorithms*", 2nd edition, Galgotia Publications, New Delhi, 2010.

3. Subrahmanian V S, "*Principles of Multimedia Database Systems*", 2nd edition, Morgan Kaufman series in Database management systems, USA, 2013.