B. Sc. (Information Tech	Semester – III		
Course Name: Data Structures		Course Code: USIT302	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	21/2	75
	Internal		25

Unit	Details	Lectures
I	Introduction: Data and Information, Data Structure, Classification of Data Structures, Primitive Data Types, Abstract Data Types, Data structure vs. File Organization, Operations on Data Structure, Algorithm, Importance of Algorithm Analysis, Complexity of an Algorithm, Asymptotic Analysis and Notations, Big O Notation, Big Omega Notation, Big Theta Notation, Rate of Growth and Big O	
	Notation. Array : Introduction, One Dimensional Array, Memory Representation of One Dimensional Array, Traversing, Insertion, Deletion, Searching, Sorting, Merging of Arrays, Multidimensional Arrays, Memory Representation of Two Dimensional Arrays, General Multi- Dimensional Arrays, Sparse Arrays, Sparse Matrix, Memory Representation of Special kind of Matrices, Advantages and Limitations of Arrays.	12
II	Linked List: Linked List, One-way Linked List, Traversal of Linked List, Searching, Memory Allocation and De-allocation, Insertion in Linked List, Deletion from Linked List, Copying a List into Other List, Merging Two Linked Lists, Splitting a List into Two Lists, Reversing One way linked List, Circular Linked List, Applications of Circular Linked List, Two way Linked List, Traversing a Two way Linked List, Searching in a Two way linked List, Insertion of an element in Two way Linked List, Deleting a node from Two way Linked List, Header Linked List, Applications of the Linked list, Representation of Polynomials, Storage of Sparse Arrays, Implementing other Data Structures.	12
III	 Stack: Introduction, Operations on the Stack Memory Representation of Stack, Array Representation of Stack, Applications of Stack, Evaluation of Arithmetic Expression, Matching Parenthesis, infix and postfix operations, Recursion. Queue: Introduction, Queue, Operations on the Queue, Memory Representation of Queue, Array representation of queue, Linked List Representation of Queue, Circular Queue, Some special kinds of queues, Deque, Priority Queue, Application of Priority Queue, Applications of Queues. 	12

IV	Sorting and Searching Techniques		
	Bubble, Selection, Insertion, Merge Sort. Searching: Sequential,		
	Binary, Indexed Sequential Searches, Binary Search.		
	Tree: Tree, Binary Tree, Properties of Binary Tree, Memory		
	Representation of Binary Tree, Operations Performed on Binary Tree,		
	Reconstruction of Binary Tree from its Traversals, Huffman Algorithm,		
	Binary Search Tree, Operations on Binary Search Tree, Heap, Memory		
	Representation of Heap, Operation on Heap, Heap Sort.		
	Advanced Tree Structures: Red Black Tree, Operations Performed		
	on Red Black Tree, AVL Tree, Operations performed on AVL Tree, 2-		
	3 Tree, B-Tree.		
V	Hashing Techniques		
	Hash function, Address calculation techniques, Common hashing		
	functions Collision resolution, Linear probing, Quadratic, Double		
	hashing, Bucket hashing, Deletion and rehashing		
	Graph: Introduction, Graph, Graph Terminology, Memory	12	
	Representation of Graph, Adjacency Matrix Representation of Graph,		
	Adjacency List or Linked Representation of Graph, Operations		
	Performed on Graph, Graph Traversal, Applications of the Graph,		
	Reachability, Shortest Path Problems, Spanning Trees.		

Books and References:								
Sr.	Title	Author/s	Publisher	Edition	Year			
No.								
1.	A Simplified Approach	Lalit Goyal, Vishal	SPD	1 st	2014			
	to Data Structures	Goyal, Pawan Kumar						
2.	An Introduction to Data	Jean – Paul Tremblay	Tata	2^{nd}	2007			
	Structure with	and Paul Sorenson	MacGraw					
	Applications		Hill					
3.	Data Structure and	Maria Rukadikar	SPD	1 st	2017			
	Algorithm							
4.	Schaum's Outlines Data	Seymour Lipschutz	Tata	2 nd	2005			
	structure		McGraw					
			Hill					
5.	Data structure – A	AM Tanenbaum, Y	Prentice	2 nd	2006			
	Pseudocode Approach	Langsam and MJ	Hall India					
	with C	Augustein						
6.	Data structure and	Weiss, Mark Allen	Addison	1 st	2006			
	Algorithm Analysis in C		Wesley					