Data Structures	**3**	**0**	**2**	**Fundamentals of Programming**

Course Objective: 1) Design correct programs to solve problems.
2) Choose efficient data structures and apply them to solve problems.

S. NO	Course Outcomes (CO)
CO1	Ability to select the data structures that efficiently model the information in a problem.
CO2	Ability to assess efficiency trade-offs among different data structure implementations or combinations.
CO3	Implement and know the application of algorithms for sorting and pattern matching.
CO4	Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.

S. NO	Contents	Contact Hours
UNIT 1	Introduction: Introduction to Algorithmic, Complexity- Time-Space Trade off. Introduction to abstract data types, design, implementation and applications. Introduction to List data structure. Arrays and Strings: Representation of Arrays in Memory: one dimensional, Two dimensional and Multidimensional, Accessing of elements of array, performing operations like Insertion, Deletion and Searching. Sorting elements of arrays. Strings and String Operations. Stacks and Queues: Introduction to data structures like Stacks and Queues. Operations on Stacks and Queues, Array representation of Stacks , Applications of Stacks : recursion, Polish expression and their compilation conversion of infix expression to prefix and postfix expression, Operations of Queues, Representations of Queues Applications of Queues, Priority queues.	**10**
UNIT 2	Linked Lists: Singly linked lists, Representation of linked list, Operations of Linked list such as Traversing, Insertion and Deletion, Searching, Applications of Linked List. Concepts of Circular linked list and Doubly linked list and their Applications. Stacks and Queues as linked list.	**7**

UNIT 3	Trees: Basic Terminology, Binary Trees and their representation, binary search trees, various operations on Binary search trees like traversing, searching , Insertion and Deletion , Applications of Binary search Trees , Complete Binary trees, Extended binary trees. General trees, AVL trees, Threaded trees, B- trees.	**9**
UNIT 4	Graphs: Terminology and Representations, Graphs & Multi-graphs, Directed Graphs, Representation of graphs and their Transversal, Spanning trees, shortest path and Transitive Closure, Activity Networks, Topological Sort and Critical Paths, Strongly connected components, Bipartite Graphs.	**8**
UNIT 5	File Structure: File Organization, Indexing & Hashing, Hash Functions, Collision Resolution Techniques. Searching and Sorting: Linear Search, Binary search, Interpolation Search,Insertion Sort, Quick sort, Merge sort, Heap sort, sorting on different keys, External sorting.	**8**
	TOTAL	**42**

REFERENCES		
S.No.	**Name of Books/Authors/Publishers**	**Year of Publication / Reprint**
1	Horowitz and Sahni, “Fundamentals of Data structures”, Galgotia publications.	1999
2	Tannenbaum, “Data Structures”, PHI.	2007
3	An introduction to data structures and application by Jean Paul Tremblay & Pal G. Sorenson (McGraw Hill).	2017
4	Data Structures and Algorithms Made Easy by Narasimha Karumanchi, CareerMonk Publications	2016

B.Tech. Information Technology				
Course code: Course Title	**Course Structure**			**Pre-Requisite**
	L	**T**	**P**	Probability, Statistics, Linear