DATA STRUCTURES LABORATORY

III Semester: ME / CSE / IT / ECE / CE	IV Semester AE / EEE							
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
ACSB05	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	-	3	1.5	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		

OBJECTIVES:

The course should enable the students to:

I.   Understand various data representation techniques in the realworld.
II. Implement linear and non-linear datastructures.
III. Analyze various algorithms based on their time and spacecomplexity.
IV. Develop real-time applications using suitable datastructure.
V.   Identify suitable data structure to solve variouscomputingproblems.

COURSE OUTCOMES (COs):

The student will have the ability to:

CO 1: Understand the concept of data structures, python and apply algorithm for solving problems like Sorting, searching, insertion and deletion of data.

CO 2: Understand linear data structures for processing of ordered or unordered data.

CO 3: Explore various operations on dynamic data structures like single linked list, circular linked list and doubly linked list.

CO 4: Explore the concept of non linear data structures such as trees and graphs.

CO 5: Understand the binary search trees, hash function, and concepts of collision and its resolution methods.

COURSE LEARNING OUTCOMES:

1. Understand the basic concepts ofpython.
2. Explore an algorithm to find the location of an element in a givenlist.
3. Choose a suitable algorithm to organize the data in ascending or descendingorder.
4. Implementation of stack and queues usinglists.
5. Understand application of stacks in arithmetic expression conversion andevaluation.
6. Understand working and implementation of single linkedlist.
7. Understand the basic operations like insertion and deletion operations associated with double linked list.
8. Understand working and implementation of stack and queue using linkedlist
9. Understand working and implementation of stack and queue using linkedlist
10. Understand the concept of non-linear data structures viz. trees andgraphs.
11. Understand graphs and graph traversal techniques like Depth first search and Breadth firstsearch.
12. Understand the operations of binary search tree like tree traversals and counting the number of nodes in the binary searchtree.

LIST OF EXPERIMENTS	
Week -1	**BASICS OF PYTHON**
Write Python programs for the following: To find the biggest of given n numbers using control statements and lists To print the Fibonacci series using functions To find GCD of two numbers
Week -2	**SEARCHING TECHNIQUES**
Write Python programs for implementing the following searching techniques to arrange a list of integers in ascending order. a. Linearsearch b. Binarysearch
Week -3	**SORTING TECHNIQUES**
Write Python programs for implementing the following sorting techniques to arrange a list of integers in ascending order. a. Bubblesort b. Insertionsort c. Selectionsort
Week -4	**IMPLEMENTATION OF STACK AND QUEUE**
Write Python programs to for the following: a. Design and implement Stack and its operations usingList. b. Design and implement Queue and its operations usingList.
Week -5	**APPLICATIONS OF STACK**
Write Python programs for the following: a. Uses Stack operations to convert infix expression into postfix expression. b. Uses Stack operations for evaluating the postfix expression.
Week-6	**IMPLEMENTATION OF SINGLE LINKED LIST**
Write Python programs for the following operations on Single Linked List. (i) Creation (ii) insertion (iii) deletion (iv) traversal
Week -7	**IMPLEMENTATION OF CIRCULAR SINGLE LINKED LIST**
Write Python programs for the following operations on Circular Linked List. (i) Creation (ii) insertion (iii) deletion (iv) traversal
Week -8	**IMPLEMENTATION OF DOUBLE LINKED LIST**
Write Python programs for the following operations on Double Linked List. (i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways.
Week -9	**IMPLEMENTATION OF STACK USING LINKED LIST**
Write a Python program to implement Stack using linked list.

Week -10	IMPLEMENTATION OF QUEUE USING LINKED LIST
Write a Python program to implement Linear Queue using linked list.	
Week -11	GRAPH TRAVERSAL TECHNIQUES
Write Python programs to implement the following graph traversal algorithms: a. Depth firstsearch. b. Breadth firstsearch.	
Week -12	IMPLEMENTATION OF BINARY SEARCH TREE
Write a Python program to perform the following: a. Create a binary searchtree. b. Traverse the above binary search tree recursively in pre-order, post-orderandin-order. c. Count the number of nodes in the binary searchtree.	

LIST OF REFERENCE BOOKS:

1. Rance D. Necaise, "Data Structures and Algorithms using Python", Wiley, John Wiley& Sons, INC.,2011.
2. Benjamin Baka, David Julian, "Python Data Structures and Algorithms", Packt PublishingLtd., 2017.

WEB REFERENCES:

1. https://docs.python.org/3/tutorial/datastructures.html
2. http://interactivepython.org/runestone/static/pythonds/index.html
3. http://www.tutorialspoint.com/data_structures_algorithms
4. http://www.geeksforgeeks.org/data-structures/
5. http://www.studytonight.com/data-structures/
6. http://www.coursera.org/specializations/data-structures-algorithms
7. http://cse01-iiith.vlabs.ac.in/