



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad – 500043

## Information Technology

### List of Laboratory Experiments

DATA STRUCTURES LABORATORY								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACS02	Foundation	L	T	P	C	CIA	SEE	Total
		0	0	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes:36			
Branch: IT	Semester: I	Academic Year: 2021-22			Regulation: UG20			
<p><b>Course overview:</b> The course covers some of the general-purpose data structures and algorithms, and software development. Topics covered include managing complexity, analysis, static data structures, dynamic data structures and hashing mechanisms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter in real life. This course reaches to student by power point presentations, lecture notes, and lab which involve the problem solving in mathematical and engineering areas.</p>								
<p><b>Course objectives:</b>  <b>The students will try to learn:</b></p> <ol style="list-style-type: none"> <li>To provide students with skills needed to understand and analyze performance trade-offs of different algorithms / implementations and asymptotic analysis of their running time and memory usage.</li> <li>To provide knowledge of basic abstract data types (ADT) and associated algorithms: stacks, queues, lists, tree, graphs, hashing and sorting, selection and searching.</li> <li>The fundamentals of how to store, retrieve, and process data efficiently.</li> <li>To provide practice by specifying and implementing these data structures and algorithms in Python.</li> <li>Understand essential for future programming and software engineering courses.</li> </ol>								
<p><b>Course outcomes:</b></p> <p><b>CO 1:</b> Implement different sorting and searching algorithms to arrange and access the data in a efficient manner.</p> <p><b>CO 2:</b> Apply the operations of Stack and Queues for evaluating the Expressions.</p> <p><b>CO 3:</b> Make use of functions to perform the different operations on different types of Linked Lists.</p> <p><b>CO 4:</b> Write the programs for implementing stack and queue operations</p> <p><b>CO 5:</b> Perform traversals of each node on graphs using BFS and DFS.</p> <p><b>CO 6:</b> Create Binary Search Tree for a given data.</p>								
WEEK NO	EXPERIMENT NAME							CO
WEEK – I	<b>SEARCHING TECHNIQUES</b>							CO 1
	Write Python programs for implementing the following searching techniques. a. Linear search. b. Binary search. c. Fibonacci search.							
WEEK – II	<b>SORTING TECHNIQUES</b>							CO 1
	Write Python programs for implementing the following sorting techniques to arrange a list of integers in ascending order. a. Bubble sort. b. Insertion sort. c. Selection sort.							
WEEK – III	<b>SORTING TECHNIQUES</b>							CO 1

	Write Python programs for implementing the following sorting techniques to arrange a list of integers in ascending order. a. Quick sort. b. Merge sort.	
<b>WEEK – IV</b>	<b>IMPLEMENTATION OF STACK AND QUEUE</b>	<b>CO 2</b>
	Write Python programs to a. Design and implementation Stack and its operations using Arrays. b. Design and implementation Queue and its operations using Arrays	
<b>WEEK – V</b>	<b>APPLICATIONS OF STACK</b>	<b>CO 2</b>
	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	
<b>WEEK – VI</b>	<b>IMPLEMENTATION OF SINGLE LINKED LIST</b>	<b>CO 3</b>
	Write Python programs for the following: a. Uses functions to perform the following operations on single linked list. (i) Creation (ii) insertion (iii) deletion (iv) traversal b. To store a polynomial expression in memory using linked list.	
<b>WEEK – VII</b>	<b>IMPLEMENTATION OF CIRCULAR SINGLE LINKED LIST</b>	<b>CO 3</b>
	Write Python programs for the following: Uses functions to perform the following operations on Circular linked list. (i) Creation (ii) insertion (iii) deletion (iv) traversal	
<b>WEEK –VIII</b>	<b>IMPLEMENTATION OF DOUBLE LINKED LIST</b>	<b>CO 4</b>
	Write Python programs for the following: Uses functions to perform the following operations on double linked list. (i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways.	
<b>WEEK - IX</b>	<b>IMPLEMENTATION OF STACK USING LINKED LIST</b>	<b>CO 4</b>
	Write Python programs to implement stack using linked list.	
<b>WEEK - X</b>	<b>IMPLEMENTATION OF QUEUE USING LINKED LIST</b>	<b>CO 4</b>
	Write Python programs to implement queue using linked list.	
<b>WEEK - XI</b>	<b>GRAPH TRAVERSAL TECHNIQUES</b>	<b>CO 5</b>
	Write Python programs to implement the following graph traversal algorithms: a. Depth first search. b. Breadth first search.	
<b>WEEK - XII</b>	<b>IMPLEMENTATION OF BINARY SEARCH TREE</b>	<b>CO 6</b>
	Write a Python program that uses functions to perform the following: a. Create a binary search tree. b. Traverse the above binary search tree recursively in pre-order, post-order and in-order. c. Count the number of nodes in the binary search tree.	