

Subject Code: 1ET1100201	Subject Title: Data Structures Using C
Pre-requisite	---

Course Objective: To make students understand concepts of Primitive and non-primitive Data structure. To make students understand concepts of stack, queue and types of queues. To make students understand concepts of Link-list and related applications. To make students work with searching and sorting techniques.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	1	2	5	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Overview of Data Structure: Introduction to data structure, Classification of Data Structure – Primitive data Structure, Non Primitive Data Structure, Linear Data Structure, Non Linear Data Structure, Operations, Algorithms, algorithm complexities, mathematical notations of algorithm.	4	10
2	Array : Array and its advantages and limitations, Types of Arrays, Memory representations of Array ,Operations with Array	2	10
3	Stack and Queue: Stack data structure ,Operations on stack (Push, Pop, Peep), Applications of stack-Recursion, Simple Queue data structure, Operations with Queue (insert, delete and view),Circular queue, Introduction to Dequeue and priority queue, Applications of queue, Round robin algorithm simulation	6	15
4	Linked Lists: Introduction, Linked Lists, Representation of Linked Lists in Memory, Traversing a Linked List, Searching a Linked List, Memory Allocation; Garbage Collection, Insertion into a Linked List, Deletion from a Linked List, Header Linked Lists, Two-Way Lists, Insertion in a Linked lists.	6	20
5	Sorting and Hashing : Introduction, Types of Sorting – Selection, Bubble, Insertion, Shell, Quick, Hash function, Address calculation techniques, Common hashing functions Collision resolution, Linear probing, Quadratic, Double hashing, Bucket hashing, Deletion and rehashing	10	20
6	Tree and Graph: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees. Graph and Their Applications Introduction, Graph Theory Terminology, Sequential Representation of Graph, Different Operations on Graphs, Traversing A Graph (DFS, BFS).	12	25

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Recognize the need of various data structures	2. Understanding
CLO2	Analyze various structures and their applicability	3. Application 4. Analyze
CLO3	Design and implement various techniques for searching, sorting and recurrence	6. Create
CLO4	Identify the appropriate data structure and algorithm design method for the given application	1.Remembrance 3.Application
CLO5	Solve the given a problem using an appropriate data structure to achieve optimal performance and compare its performance with other possible data structures.	5. Evaluate

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	M	M	H	M	H	M	H	L	M	L	L	H	H	M	M	M
CLO2	M	M	H	H	H	M	-	L	M	L	M	H	M	H	H	M
CLO3	M	H	M	M	H	L	-	L	H	L	H	H	H	H	M	H
CLO4	H	M	M	L	H	M	L	L	H	M	M	H	M	M	H	H
CLO5	M	L	M	M	M	L	M	M	H	M	H	H	M	M	H	M

H: High, M: Medium, L: Low

List of References:

1. An Introduction to Data Structures with Applications. by Jean - Paul Tremblay & Paul G. Sorenson Publisher - Tata McGraw Hill.
2. Data Structures using C & C++ - By Tanenbaum Publisher – Prentice – Hall International.
3. Fundamentals of Computer Algorithms by Horowitz, Sahni, Galgotia Pub. 2001 ed.

e-Resource:

1. <http://nptel.ac.in/courses/106102064/1>
2. <http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html>
3. http://www.nptelvideos.com/computer_science/datastructures_algorithms.php
4. https://www.tutorialspoint.com/data_structures_algorithms/ List of Experiments:

List of Experiments:

Note: The experiment list provided beneath is for reference only. The course teacher may change/formulate it as per his/her methodology and requirement.

- 1 Write a program to check whether a given matrix is a magic square matrix or not.
- 2 Implement a program for stack that performs following operations using arrays. (a) PUSH (b) POP (c) PEEP (d) CHANGE (e) DISPLAY
- 3 Implement a program to convert infix notation to postfix notation using stack.
- 4 WAP to implement QUEUE using arrays that performs following operations (a) INSERT (b) DELETE (c) DISPLAY
- 5 Write a program to implement Circular Queue using arrays that performs following operations. (a) INSERT (b) DELETE (c) DISPLAY
- 6 Write a program for insert routine in input restricted dequeues.
- 7 Write a menu driven program to implement following operations on the singly linked list. (a) Insert a node at the front of the linked list. (b) Insert a node at the end of the linked list. (c) Insert a node such that the linked list is in ascending order. (d) Delete the first node of the linked list. (e) Delete a node before specified position. (f) Delete a node after specified position.
- 8 Write a program to concatenate two doubly linked lists.
- 9 Implement recursive and non-recursive tree traversing methods in-order, preorder and postorder traversal.
- 10 Write a program to sort an elements using (a) Insertion Sort (b) Selection Sort (c) Quick Sort (d) Merge Sort