



**DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE
(AUTONOMOUS)**

(Approved by AICTE & Affiliated to Anna University, Chennai)

Re-Accredited by NAAC with 'A' Grade

Accredited by NBA for AERO, BME, CSE, ECE, EEE, IT & MECH.

PERAMBALUR-621212, TAMILNADU, INDIA.

Website: www.dsengg.ac.in



COURSE PLAN 2025-2026

Course Code/Name	U23AIT32/ DATA STRUCTURES			
Year/Section/Department	II/A,B/AI&DS			
Credits Details	L:3	T:0	P:0	C:3
Total Contact Hours Required	45			

Syllabus:

UNIT I LINEAR DATA STRUCTURES – LIST	No. of Periods 9
Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation - singly linked lists- circularly linked lists- doubly-linked lists – applications of lists.	
UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES	No. of Periods 9
Stack ADT-Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT-Operations - Circular Queue-Priority Queue – deQueue- applications of queues.	
UNIT III NON-LINEAR DATA STRUCTURES – TREES	No. of Periods 9
Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree - Heap – Applications of heap.	
UNIT IV NON-LINEAR DATA STRUCTURES - GRAPHS	No. of Periods 9
Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.	
UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES	No. of Periods 9
Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.	

Objective:

- ❖ To understand the concepts of ADTs
- ❖ To Learn linear data structures – lists, stacks, and queues
- ❖ To understand sorting, searching and hashing algorithms
- ❖ To apply Tree and Graph structures
- ❖ To learn the Concept of Hashing Techniques

Text Book:

T1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 1997.

T2. Reema Thareja, “Data Structures Using C”, Second Edition, Oxford University Press, 2011..

Reference Book:

R1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, Second Edition, Mcgraw Hill, 2002.

R2. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.

R3. Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education.

R4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008.

Website:

W1: <http://www.iwr.uni-heidelberg.de/groups/comopt/teaching/ws05/graph-theory/graph-theory-2.pdf> (TOPIC NO: 34)

W2: http://courses.cs.vt.edu/cs2104/Fall12/notes/T17_DivideAndConquer.pdf (TOPIC NO: 38 & 39)

Online Mode of Study (if Any):

NPTEL details can be listed.

- ❖ DATA STRUCTURES AND ALGORITHM: <https://nptel.ac.in/courses/106/102/106102064/>

Course Plan:

Topic No	Topic Name	Reference Detail	Page No	Teaching Methodology	No of periods required	Cumulative periods
UNIT I LINEAR DATA STRUCTURES – LIST						
1	Course Introduction , Abstract Data Types (ADTs)	T1	57	BB	1	1
2	List ADT	T1	58	BB	1	2
3	Array-based implementation	T1	59	BB	1	3
4	Linked list implementation	T1	59	BB	1	4
5	Singly linked lists - All operations (Insertion, Deletion, Merge, Traversal).	T1	59-67	BB	1	5
6	Doubly-linked lists - All operations (Insertion, Deletion,	T2	315-324	BB & VIDEO	1	6

7	Circularly linked lists, - All operations (Insertion, Deletion,	T2	332-336	BB & VIDEO	1	7
8	Applications of lists	T1	68	BB	1	8
9	Polynomial Manipulation	T1	68-72	BB	1	9

Outcome of Unit I:**CO1:**

- Describe linear data structures using array and linked list.

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES

10	Stack ADT – Operations.	T1	78-87	BB & VIDEO	1	10
11	Applications - Evaluating	T1	87-90	BB	1	11
12	Conversion of Infix to postfix expression.	T1	90-93	BB	1	12
13	Queue ADT – Operations.	T1	95-100	BB &	1	13
14	Circular Queue.	T2	382-387	BB	1	14
15	Priority Queue.	T2	397-399	BB	1	15
16	DeQueue.	T2	392-397	BB	1	16
17	Applications of queues.	T1	100	BB	1	17
18	Sample program discussion for Stack and Queue.	T2	354-356 &	BB	1	18

Outcome of Unit II:**CO2:**

- Apply various operations like stacks, queues in linear data structure.

UNIT - III STACKS AND QUEUES: STACKS (9)

19.	Tree AD, Tree traversals	T1	351-357	BB	1	19
20.	Binary Tree ADT	T1	358-363	BB	1	20
21.	Expression Trees, Applications of trees	R3	366-377	BB	1	21
22.	Binary search tree ADT	T1	364-365	BB	1	22
23.	Threaded Binary Trees	T1	383-387	BB	1	23
24.	AVL Trees, B-Tree	T1	397-400	BB	1	24
25.	B+ Tree	T1	401-420	BB	1	25
26.	Heap	T1	425-430	BB	1	26
27.	Applications of	T1	436-445	BB	1	27

Outcome of Unit III:

CO3: Demonstrate non-linear data structures tree and its application.

UNIT IV**GRAPHS****(9)**

28.	Graph Definition, Representation of Graphs	T1	467-469	BB	1	28
29.	Types of Graphs	T1	470-478	BB	1	29
30.	Breadth first traversal	T1	482-483	BB	1	30
31.	Depth first traversal	W1	-	BB	1	31
32.	Binconnectivity	T1	526-533	BB	1	32
33.	Euler Circuits, Topological Sort	T1	543-552	BB	1	33
34.	Dijkstra's algorithms	T1	553-568	BB	1	34
35.	Minimum Spanning Tree	T1	587-600	BB	1	35
36.	Prim's algorithm, Kruskal's algorithm,	R4	604-617	BB	1	36

Outcome of Unit IV:**C04:**

- Apply various algorithms and operations in graph

UNIT V INTRODUCTION TO ALGORITHM DESIGN TECHNIQUES (9)

37.	Searching, Linear Search	T1	781-786	BB	1	37
38.	Binary Search	W2	-	BB	1	38
39.	Sorting, Bubble Sort	T1	792-799	BB	1	39
40.	Selection Sort, Insertion Sort	T1	800-808	BB	1	40
41.	Shell Sort, Merge Sort	W3	-	BB	1	41
42.	Hashing, Hash functions	T1	809-818	BB	1	42
43.	Separate Chaining,	T1	820-825	BB	1	43
44.	Open Addressing	T1	826-830	BB	1	44
45.	Rehashing, Extendible Hashing	W3	835-340	BB	1	45

Outcome of Unit III:**C05:**

- Apply searching, sorting and hashing techniques in data structures.

C06:

- Interpret sorting algorithms for a given problem

Course Outcome:

At the end of course:(Consolidated outcome)

Students should be able to do:

C01: Describe linear data structures using array and linked list.

C02: Apply various operations like stacks, queues in linear data structure

C03: Demonstrate non-linear data structures tree and its application.

C04: Apply various algorithms and operations in graph

C05: Apply searching, sorting and hashing techniques in data structures.

C06: Interpret sorting algorithms for a given problem

Course Outcome Vs Program Outcome Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	1	1	3	2	1	1	2	1	2	1	1	2
CO 2	3	2	2	3	2	3	1	1	1	1	2	2	2	1
CO 3	2	3	2	2	2	2	-	1	2	2	3	2	1	1
CO 4	2	3	2	2	3	1	-	-	2	1	2	1	1	2
CO 5	1	1	3	1	2	1	1	-	3	3	2	2	1	2
CO6	3	2	1	2	3	2	-	-	1	2	1	2	-	3
Avg	2.17	2	1.83	1.83	2.5	1.83	1	1	1.83	1.67	2	1.67	1.2	1.83

[Levels of correlation:3 (High),2 (Medium), 1(Low)]

Content Beyond Syllabus:

- ❖ Quick Sort
- ❖ Linked list, sorting

Internal Evaluation Components:

Web portal	Assignment	Components	Topic Number with Topic / Unit Details	Relevance to CO
Web portal 1	--	Assessment – I (60)	Unit I and II	CO 1 & CO2
	1	Assignment – Handwritten (20)	<ul style="list-style-type: none"> • Polynomial manipulation • Stack ADT and operations 	CO 1 & CO2
	2	Assignment – Poster Presentation / PPT (20)	<ul style="list-style-type: none"> • Singly linked lists • doubly linked lists • various operations in list ADT • Queue 	CO 1 & CO2
Web portal 2	--	Assessment – II (60)	Unit III and IV	CO3 & CO4
	3	Seminar (20)	Tree ADT AVL Trees Topological Sort	CO3 & CO4
	4	Case Study Report (20)	Binary Tree ADT Breadth-first-traversal Prim's algorithm	CO3 & CO4
Web portal 3	--	Model Exam (75)	Unit I to V	CO1 to CO6
	5	MCQ (15)	Unit I to V	CO1 to CO6
	-	Course Attendance (10)	--	--

Submission Details:

Phase 1(Before AT 1)		Phase 2 (Before AT 2)		Phase 3 (Model)
Assignment 1	Assignment 2	Assignment 3	Assignment 4	Assignment 5

Google Class Code Details:

Class Name:

PLAN OF ASSESSMENT TEST -DISTRIBUTION OF MARKS:

TEST	CO- MARK WISE DISTRIBUTION						BLOOM'S LEVEL MARK WISE DISTRIBUTION					
	C01	C02	C03	C04	C05	C06	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
AT-1	37	23	--	--	--	--	8	19	16	17	--	--
	--	--	37	23	--	--	10	18	19	13	--	--
MODEL	20	20	20	20	16	4	6	38	36	20		

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