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

Name of the Faculty				
Designation/Department	**AP/IT**			
Course Code/Name	**U23ITT32/ DATA STRUCTURES**			
Year/Section/Department	**II/-/IT-C**			
Credits Details	**L:3**	**T:0**	**P:0**	**C:3**
Total Contact Hours Required	**45**			

Syllabus:

UNIT I INTRODUCTION AND LINEAR DATA STRUCTURE – LIST	**No. of Periods 9**
Introduction to Data structure, Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation ––singly linked lists- circularly linked lists- doubly-linked lists – applications of lists – Polynomial ADT – Radix Sort – Multilists	
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**
Graph Definition – Representation of Graphs – Types of Graph - Breadth-first traversal – Depth- first traversal –– Bi-connectivity – Euler circuits – Topological Sort – Dijkstra's algorithm – Minimum Spanning Tree – Prim's algorithm – Kruskal's algorithm	
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 – Merge Sort – Hashing – Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing	

Objective:

1. To understand the concepts of ADTs
2. To Learn linear data structures – lists, stacks, and queues
3. To understand sorting, searching and hashing algorithms
4. To apply Tree and Graph structures

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: Kruskal's algorithm (https://www.tutorialspoint.com/data_structures_algorithms/kruskals_spanning_tree_algorithm.htm)
W2: Greedy Method (https://www.studytonight.com/data-structures/greedy-algorithm)
W3: Backtracking (https://www.geeksforgeeks.org/backtracking-introduction/)

Online Mode of Study (if Any):

NPTEL details can be listed.

- https://nptel.ac.in/courses/106/102/106102064/
- https://nptel.ac.in/courses/106/106/106106133/
- https://nptel.ac.in/courses/106/106/106106127/ http://www.nptelvideos.com/video.php?id=1003
- https://nptel.ac.in/content/storage2/courses/downloads_new/106106127/noc18-cs25_Week_08_Assignment_01.pdf
- https://www.youtube.com/watch?v=PGWZUgzDMYI

Course Plan:

Topic No	Topic Name	Reference Detail	Page No	Teaching Methodology	No of periods required	Cumulative periods
UNIT I	**TREE STRUCTURE**				**(9)**	
1.	Introduction to Data Structure	T1	4	BB	1	1
2.	Abstract Data Types (ADTs), List	T1	8	BB	1	2
3.	Array based Implementation	T1	11	BB	1	3
4.	Linked list implementation	T1	14	BB	1	4

5.	Singly liked lists, Circularly linked lists, Doubly linked lists	T1	5	BB	1	5
6.	Applications of lists	T1	7	BB	1	6
7.	Polynomial ADT	T1	78-86	BB	1	7
8.	Radix Sort	T1	66-74	BB	1	8
9.	Multilists	R1	91-92	BB	1	9

Outcome of Unit I:

CO1:

- Learn linear data structures using array and linked list.

UNIT II	**SEARCH STRUCTURES AND INDEXING**					**(9)**
10.	Stack ADT, Operations, Applications	T1	105-110	BB	1	10
11.	Evaluating arithmetic	T1	115-122	BB	1	11
12.	Conversion of Infix to postfix expression	T1	261-283	BB	1	12
13.	Queue ADT	T1	163-183	BB	1	13
14.	Operations	R2	203-212	BB	1	14
15.	Circular Queue	T1	213-223	BB	1	15
16.	Priority Queue	T1	315-317	BB	1	16
17.	deQueue	T1	322-327	BB	1	17
18.	Application of Queue	T1	333-337	BB	1	18

Outcome of Unit II:

CO2:

- Understand 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: Outline 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:
CO4:

- Illustrate 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:
CO5:

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

CO6:

- Interpret sorting algorithms for a given problem

Course Outcome:

At the end of course:**(**Consolidated outcome)
Students should be able to do:
CO1: Learn linear data structures using array and linked list.
CO2: Understand various operations like stacks, queues in linear data structure

CO3: Outline non-linear data structures tree and its application.
CO4: Illustrate various algorithms and operations in graph
CO5: List searching, sorting and hashing techniques in data structures.
CO6: 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	1	-	-	-	-	1	-	-	-	-
CO 2	3	2	2	1	2	-	-	-	-	1	-	-	-	-
CO 3	2	3	2	1	2	-	-	-	-	2	-	-	-	-
CO 4	2	3	2	2	2	-	-	-	-	1	-	-	-	-
CO 5	2	2	3	2	3	-	-	-	-	3	-	-	-	-
CO6	3	2	1	2	1	-	-	-	-	2	-	-	-	-
Avg	2.33	2.17	1.83	1.5	1.83	-	-	-	-	1.67	-	-	-	-

[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)	List ADT Singly linked lists Queue ADT	CO 1 & CO2
	2	Assignment – Poster Presentation / PPT (20)	Circularly linked lists Stack ADT Priority 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 Classroom Code :

Google Classroom Name : U23ITT32 Data Structures

PLAN OF ASSESSMENT TEST –DISTRIBUTION OF MARKS:

TEST	**CO- MARK WISE DISTRIBUTION**						**BLOOM'S LEVEL MARK WISE DISTRIBUTION**					
AT-1	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**BTL1**	**BTL2**	**BTL3**	**BTL4**	**BTL5**	**BTL6**
	37	**23**	**--**	**--**	**--**	**--**	**12**	**48**	**--**	**--**	**--**	**--**
AT-2	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**BTL1**	**BTL2**	**BTL3**	**BTL4**	**BTL5**	**BTL6**
	--	**--**	**37**	**23**	**--**	**--**	**08**	**20**	**32**	**--**	**--**	**--**
MODEL	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**BTL1**	**BTL2**	**BTL3**	**BTL4**	**BTL5**	**BTL6**
	20	**20**	**20**	**20**	**10**	**10**	**26**	**40**	**34**	**--**	**--**	**--**

Prepared By **Verified By**

AP/IT **HOD/IT**

Approved By

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