

KU4DSCCSC 209 : DATA STRUCTURES

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
4	DSC	200 -299	KU4DSCCSC209	4	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2		35	65	100	1.5hrs.

Course Description: *Understanding data structures and algorithms enables to understand the problem statements on a deeper level and create logical solutions to solve them. Data structures are useful to implement the physical forms of abstract data types.*

Course Prerequisite: NIL

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Discuss the complexity of algorithm.	U
2	Differentiate linear and nonlinear data structures.	U
3	Use suitable data structures for a given problem.	A
4	Design programmes using data structures.	C

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	3				
CO 2	3	2					
CO 3	3	2	3				3
CO 5	3	3	3				

COURSE CONTENTS

Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
1	MODULE TITLE: Elementary Data Organization		15
	1	Data Structures	
		a) Data Structure Classification	
		b) Operations of Data Structures	
	2	Linear Arrays	
		a) operations	
		b)Application	
		c)Polynomial- Representation with arrays	
		d)Polynomial addition	
	3	Stack	
		a) Operations	
		b) Application	
		c)Evaluation of post fix expression	
	4	Queue	
		a) Operations	
		b) Printer Queue as application,	
		c) Circular Queue	
		d)Deque	
		e)Priority Queue	

		Linked Lists: Definition, Representation of Linked List in memory, Traversing Linked List, Searching a linked list, Memory Allocation and Garbage Collection , Insert into a linked list, Deletion from a linked list; Header Linked Lists; Two-way Lists – Operations.	
--	--	---	--

2	MODULE TITLE: Trees		
	1	Binary Trees, Complete Binary trees, Extended Binary trees; Representing Binary trees in memory, Traversing Binary trees,	15
	2	Binary search trees – Searching and inserting in Binary Search Trees, Deleting in a Binary Search Tree.	
	3	Heap – Heap sort,	
	4	Huffman’s Algorithm	
	5	General Trees – Computer representation of general trees	

3	MODULE TITLE: Graphs		
	1	Graph Theory terminology; Sequential Representation of Graphs – Adjacency Matrix, Path Matrix	
	2	Operations on graph	15

	a) traversing searching	
	b) inserting	
	c) deleting	
3	Breadth- First Search and Depth First Search	

4	MODULE TITLE: Design and Analysis of Algorithms	
1	From Problems to Programs - Algorithms, Pseudo Language and Stepwise Refinement.	
	a) Abstract Data Type definition, Data Structures and Abstract Data Types	15
2	Measuring the Running Time of a Program	
	a) Asymptotic Notations – Big O, Omega, Theta	
3	Search: Linear and Binary search; comparison of searching algorithms.	
	Sort: Insertion, bubble, selection, quick and merge sort; Comparison of Sort algorithms	

5	Teacher Specific Module	
	<i>Directions</i>	
	1. Arrays - Program to insert, delete, search, and display elements in an array. - Program to find the largest and smallest element in an array. - Program to reverse an array. 2. Strings - Program for string operations: length, copy, concatenate, compare. - Program to check for palindrome. - Program to count vowels and consonants. 3. Linked List - Singly linked list: insert (beginning, end, middle), delete, display. 4. Stacks - Stack using arrays. - Stack using linked list. 5. Queues - Queue using arrays (linear).	15

- Queue using linked list.
- 6. Recursion**
- Factorial of a number.
 - Fibonacci series using recursion.
- 7. Searching and Sorting**
- Linear search.
 - Binary search.
 - Bubble sort.
 - Selection sort.
- 8. Tree**
- Binary tree creation and traversal (inorder, preorder, postorder).
 - Binary search tree (BST) operations: insert, delete, search.

Essential Readings:

1. Schaum's Outline of Theory and Problems of Data Structures – Seymour Lipschutz
Mc-Graw Hill Book Company.
2. Data Structures and Algorithms- Alfred V. Aho, John E. Hopcroft, Jeffrey
D.Ullman – Pearson Education

Suggested Readings:

1. Data Structures and Algorithms: Concepts, Techniques and Applications; GAV Pai,
McGraw Hill, 2008.
2. Data Structures in C, Achuthsankar and Mahalekshmi, PHI, 2008
3. Fundamentals of Data structures in C++, 2nd Edn, Horowitz Sahni, Anderson,
Universities Press
4. Classic Data structures, Samanta, Second Edition, PHI

Assessment Rubrics:

Evaluation Type		Marks	Evaluation Type		Marks	Total
Lecture		75	Practical		25	100
a)	ESE	50	a)	ESE	15	
				Programme code and execution	8	

					Output		3
					Viva		2
					Modification		2
b)	CCA		25	b)	CCA		10
	i	Test Paper	5		i	Punctuality	3
		Model exam	10				
	ii	Assignment/ Book- Article review /field report	5		ii	Model exam	4
	iii	Seminar/ Viva-Voce	5		iii	Record	3