Marwadi University
Faculty of Diploma Studies
Information and Communication Technology

Subject Code: 09CT0403
Subject Name: Data Structure and Algorithm design
Diploma Year – II (Semester IV)

Objective: After completion of this course, student will be able to:

1. learn efficient storage mechanisms of data for an easy access.
2. design and implementation of various basic and advanced data structures.
3. introduce various techniques for representation of the data in the real world.
4. develop application using data structures.
5. teach the concept of protection and management of data.
6. improve the logical ability

Credits Earned: 2 Credits

Course Outcomes: After completion of this course, student will be able to:

1. Understand the linear and nonlinear data structures.
2. Interpret appropriate sorting and searching technique for given problem.
3. Describe stack,queue and linked list operation.
4. Design/Develop programof the above data structures.
5. Analyse and compare algorithms for efficiency using Different techniques

Pre-requisite of course: Basic knowledge of C language

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work (TW)	
0	0	4	2	00	30	20	25	25	100

Contents:

S.NO	TOPIC	Laboratory hours
1	**Introduction to Data Structure** Types of Data Structure, Arrays, Strings, Recursion, Introduction and operation of Files	8
2	**Linked List** Introduction to Linked List, Hierarchy of LinkedList, Doubly Linked List, Constructor and Method of LinkedList, Operation of Linked List, Linked List Vs. Arrays, Application of Linked List polynomial	8
3	**STACK** Introduction to Stack, Basic features of Stack,Implementation of Stack Data Structure, Algorithm of PUSH, POP and PEEPoperation. Application of stack – Recursion, Polish Notation.	8
4	**Queues** Introduction to Queue, Basic features of Queue, Implementation of Queue Data Structure, Type of queue-simple queue, circular queue, double ended queue(dequeue), Operation of Queue insertion and deletion, application of queue.	8
5	**Trees** Basic trees concept, Binary tree representation, Binary tree operation, Binary tree traversal (in-order, pre-order, post-order), and Binary search tree implementation	8
6	**Sorting:** Sort Concept, Selection sort, Bubble sort, insertion sort, Radix sort, Insertion Sort, Quick Sort, and Merge sort **Searching:** List Search, Linear Index Search, Sequential search, Binary Search	8
7	**Hashing:** Introduction to Hashing table, building Hashing function, Introduction and handling of collision in hashing, different types of collision resolution techniques, application of hashing	8

	Total Hours	56

Suggested List of Experiment:

Sr. No.	Unit No.	PracticalExercises	Approx. Hrs. Required
1	1	Definevarioustermssuchasalgorithm,variousapproachesto designanalgorithm, timecomplexity,spacecomplexity, big‘o’ notation,bestcase,averagecaseandworst-casetimecomplexityetc. Developsimpleprogramusingpointertoastructure	2
2	1	Develop simple program using pointer to structure.	1
3	1	Implementarrayusing rowmajororderandcolumnmajororder	2
4	1	write a program to find largest number.	
5	3	Implement recursive functions : Factorial using Recursive.	
6	1	Implementvariousstring algorithms	2
7	3	Implement push and pop algorithms of stack using array.	2
8	4	Implement insert, delete algorithms of queue using array.	2
9	4	Implement insert, delete algorithms of circular queue using array.	2
10	4	Implement insert, delete algorithms of doubly queue using array.	
11	5	Implement construction binary search tree	1
12	5	Implement inorder traversal method.	1
13	5	Implement preorder traversal method	1
14	5	Implement postorder traversal method	1
15	6	Implement seaching algorithm in binary search tree.	1
16	6	Implement bubble sort algorithm.	1

17	6	Implement selction sort algorithm.	1
18	6	Implement insertion sort algorithm.	1
19	6	Implement quick sort algorithm.	1
21	6	Implement Merge Sort algorithm	1
22	7	Solve hash table example using division method, method square method, folding method (paper work only)	2
23	7	Implement construction of binary search tree	1
25	7	Implement searching algorithm in binary search tree	1
		Total	28

Suggested Text book/Main Reference:

1. Data Structures & Algorithms in Java, Robert Lafore, Pearson education, 2nd edition
2. Algorithms in Java, Robert Sedgewick with java consulting by Michael schidlowsky, Pearson education, 3rd edition.
3. Data Structures and Algorithms in Java, Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, WILEY, Sixth edition.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
40%	40%	10%	10%	0	0

Supplementary Resources:

a) http://www.nptelvideos.in/2012/11/programming-and-data-structure.html
b) http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html
c) http://www.geeksforgeeks.org/data-structures/
d) https://www.hackerrank.com/domains/data-structures/arrays