

GUJARAT TECHNOLOGICAL UNIVERSITY

Master in Computer Application (Integrated MCA)

Year II – (Semester-III) (W.E.F. July 2014)

Subject Name: Data Structures (DS)

Subject Code: 4430602

1. Learning Objectives:

- To develop proficiency in the specification, representation, and implementation of Data Types and Data Structures.
- To analyze various algorithms for space and time complexity
- To implement various searching and sorting techniques
- To compare various searching and sorting techniques
- To apply appropriate data structures to solve different problems

2. Prerequisites:

- Proficiency in a programming language
- Specification and implementation of basic operations on stack, queue, tree and graph

3. Contents:

Unit No.	Course Content	No of Lectures
1	Introduction to Data Structure and Algorithm Analysis Data Structure Definition and classification, Algorithm Analysis, Storage Representation of Strings, Text Handling and KWIC Indexing.	5
2	Linear Data Structures: Arrays, Storage Structure for Arrays, Stack : List Implementation, Applications of Stacks : Function Call, Recursion, Balancing Symbols Queue: List Implementation, Circular Queue, Priority Queue, double ended queue. Linked List : Cursor Implementation, Multi List Applications of Linked List : Addition and Multiplication of Polynomial in one and two variables	10
3	Nonlinear Data Structures: Tree - Basic Tree Concepts, Operations on Binary Trees, Storage Representation & Manipulation of Binary Trees, Conversion of General	10

	Tree to Binary Trees, Sequential & Other Representation of Trees, Application of Trees – The Manipulation of Arithmetic Expression, Multi-linked Structures - Sparse Matrices.	
4	Graphs and Their Representation Matrix Representation of Graphs, List Structures, Other Representation of Graphs, Graphs with Negative Edge Costs, Acyclic Graphs, Spanning Trees (Prim's and Kruskal's Algorithm), Shortest Path Algorithms(Dijkstra's Algorithm, Topological Sort	10
5	Sorting and Searching Techniques: Sorting – Notation and Concepts, Selection Sort, Bubble Sort, Merge Sort, Heap Sort, Quick Sort, Radix Sort, Searching - Sequential Searching, Binary Searching, Search Trees – Height Balanced, 2-3 Trees, Weight Balanced Tree, Trie Structures, Hash Table Search Methods, Introduction, Hashing Functions, Collision Resolution Techniques.	15

4. Text Books:

1. "An Introduction to Data Structures with Applications", Jean-Paul Tremblay, Paul G. Sorenson, Tata McGraw-Hill, 2nd Edition, (2007)
2. "Data Structures and algorithm analysis in C", second edition Mark Allen Weiss.

5. Reference Books:

1. "Introduction to Algorithm", Cormen, Leiserson, Rivest, Stein, , PHI (2003), 2nd Edition,
2. "Design and Analysis of Algorithms" Parag Dave & Himanshu Dave, Pearson Education (2008).
3. "Data Structures using C", A. K. Sharma, Pearson Education (2011).
4. "Data Structures: A Pseudo-code Approach with C", Gilberg & Forouzan, , Cengage Learning.
5. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-Freed, University Press (2nd edition-2007)
6. "Data Structures Using C & C++", Tenenbaum, PHI.
7. "Data Structures & Algorithms" , A V Aho, J E Hopcroft, J D Ullman, , Pearson Education (1983).
8. "Data structures and algorithms, concepts, Techniques and Applications", G. A.V.PAI, , TMH , 1st Edition (2008)
9. "Algorithm design-foundation, analysis & internet examples", Michel Goodrich, Roberto Tamassia, Wiley

6. Chapter Wise Coverage :

Unit No.	Text Books	Topics/Subtopics	No. of Lectures
1	Book-1	0-3.0 to 0-3.5, 2.4, 2.5.3	5
2	Book-1	3.2, 3.5,3.6 to 3.8,4.3.1	10
	Book-2	3.3.3,3.2.7,3.2.8	
3	Book-1	5.1.1 to 5.1.5, 5.2.1, 5.3.1	10
4	Book-1	5.4.1 to 5.4.6	10
	Book-2	9.3.2	
5	Book-1	6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.1.5, 6.1.6, 6.1.7, 6.2.1, 6.2.2, 6.2.3, 6.2.3.1, 6.2.3.2, 6.2.3.3, 6.2.3.4, 6.2.4, 6.2.4.1, 6.2.4.2, 6.2.4.3	15
		Total Number of Lectures	50