GUJARAT TECHNOLOGICALUNIVERSITY

MASTERS IN COMPUTERAPPLICATION

Year –1(Semester–II) (W.E.F. Dec 2017)

Subject Name: Data Structures (DS)
Subject Code: 3620002

Learning Objectives:

- To develop proficiency in the specification, representation, and implementation of Data Types and Data Structures.
- To introduce the concepts of algorithmic paradigms and basic data structures and their applications.
- To implement and compare various searching and sorting techniques.
- To apply appropriate data structures to solve different problems.

Prerequisites:

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

Outcomes:

- Apply sorting and searching algorithms to small and large data sets.
- Ability to design and implement abstract data types such as linked list, stack, queue, graphs and trees.

Contents:

Unit No.	Title	Number of Lectures
I	**Introduction to Data Structure and Algorithm Analysis:** Data Structure Definition and classification, Storage Representation of Strings, Text Handling and KWIC Indexing.	4
II	**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	8

III	**Nonlinear Data Structures:** **Graphs:** Introduction, Definition, Matrix Representation of Graphs, List Structures, Directed/Undirected Graphs, Weighted/Unweighted Graphs Path, Paths of different lengths, Cycle, Cylic Graphs, Acylic Graphs, Spanning Trees, Shortest Path. **Trees:** Introduction, Definition, Basic Tree Concepts, , Storage Representation of Binary Trees, Operations on Binary Trees, Tree Traversal, Conversion of General Tree to Binary Trees, Sequential & Other Representation of Trees, Application of Trees – The Manipulation of Arithmetic Expression, Multi-linked Structures - Sparse Matrices.	**14**
IV	**Sorting and Searching Techniques:** Introduction, Definition, 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, Hashing Functions, Collision Resolution Techniques.	**14**

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, Pearson Education (2002)

Chapter Wise Coverage from Text Book:

Unit No.	Text Books	Topics/Subtopics	No. of Lectures
I	Book-1	0-3.0 to 0-3.5, 2.4, 2.5.3	4
II	Book-1 Book-2	3.2, 3.5,3.6 to 3.8,4.3.1 3.3.3,3.2.7,3.2.8	8
III	Book-1	5.1.1 to 5.1.5, 5.2.1, 5.3.1, 5.4.1 to 5.4.6	14
IV	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	14
		Total Number of Lectures	40

Reference Books:

1. “Introduction to Data Structures in C”, Ashok N. Kamthane, Pearson Education (2004).
2. "Introduction to Algorithm", Cormen, Leiserson, Rivest, Stein, 2nd Edition, PHI (2003).
3. “Design and Analysis of Algorithms”, Parag H Dave, Himanshu B Dave, Pearson (2014)
4. “Data Structures Using C”, Samir Kumar Bandyopadhyay, Kashi Nath Dey, Pearson Education, Year: 2004.
5. “Data Structures and Algorithms”, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Pearson Education (2002).
6. “Fundamentals of Data Structures in C”, Horowitz, Sahni, Anderson-Freed, University Press (2nd edition-2007)
7. "Data Structures and Algorithms,Concepts, Techniques and Applications", G. A.V.PAI, , TMH , 1st Edition (2008).