DATA STRUCTURES AND APPLICATIONS
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)
SEMESTER - III

Subject Code	17CS33	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

Module -1	Teaching Hours
Introduction: Data Structures, Classifications (Primitive & Non Primitive), Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, Dynamically allocated arrays, **Array Operations**: Traversing, inserting, deleting, searching, and sorting. Multidimensional Arrays, Polynomials and Sparse Matrices. **Strings:** Basic Terminology, Storing, Operations and Pattern Matching algorithms. Programming Examples. Text 1: Ch 1: 1.2, Ch2: 2.2 -2.7 Text 2: Ch 1: 1.1 -1.4, Ch 3: 3.1-3.3,3.5,3.7, Ch 4: 4.1-4.9,4.14 Ref 3: Ch 1: 1.4	10 Hours

Module -2	
Stacks and Queues **Stacks:** Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to postfix conversion, evaluation of postfix expression, **Recursion** - Factorial, GCD, Fibonacci Sequence, Tower of Hanoi, Ackerman's function. **Queues:** Definition, Array Representation, Queue Operations, Circular Queues, Circular queues using Dynamic arrays, Dequeues, Priority Queues, A Mazing Problem. Multiple Stacks and Queues. Programming Examples. Text 1: Ch3: 3.1 -3.7 Text 2: Ch6: 6.1 -6.3, 6.5, 6.7-6.10, 6.12, 6.13	10 Hours

Module – 3	
Linked Lists: Definition, Representation of linked lists in Memory, Memory allocation; Garbage Collection. Linked list operations: Traversing, Searching, Insertion, and Deletion. Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues. Applications of Linked lists – Polynomials, Sparse matrix representation. Programming Examples Text 1: Ch4: 4.1 -4.8 except 4.6 Text 2: Ch5: 5.1 – 5.10	10 Hours

Module-4

Trees: Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Additional Binary tree operations. Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, Searching, Application of Trees-Evaluation of Expression, Programming Examples **Text 1:** Ch5: 5.1 –5.5, 5.7 **Text 2:** Ch7: 7.1 – 7.9	**10 Hours**

Module-5

Graphs: Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search. **Sorting and Searching:** Insertion Sort, Radix sort, Address Calculation Sort. **Hashing:** Hash Table organizations, Hashing Functions, Static and Dynamic Hashing. **Files and Their Organization:** Data Hierarchy, File Attributes, Text Files and Binary Files, Basic File Operations, File Organizations and Indexing **Text 1:** Ch6: 6.1 –6.2, Ch 7:7.2, Ch 8:8.1-8.3 **Text 2:** Ch8: 8.1 – 8.7, Ch 9:9.1-9.3,9.7,9.9 **Reference 2:** Ch 16: 16.1 - 16.7	**10 Hours**

Course outcomes: After studying this course, students will be able to:

- Explain different types of data structures, operations and algorithms
- Apply searching and sorting operations on files
- Make use of stack, Queue, Lists, Trees and Graphs in problem solving.
- Develop all data structures in a high-level language for problem solving.

Question paper pattern:

The question paper will have ten questions.
There will be 2 questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Fundamentals of Data Structures in C - Ellis Horowitz and Sartaj Sahni, 2nd edition, Universities Press, 2014
2. Data Structures - Seymour Lipschutz, Schaum's Outlines, Revised 1st edition, McGraw Hill, 2014

Reference Books:

1. Data Structures: A Pseudo-code approach with C –Gilberg & Forouzan, 2nd edition, Cengage Learning, 2014
2. Data Structures using C, , Reema Thareja, 3rd edition Oxford press, 2012
3. An Introduction to Data Structures with Applications- Jean-Paul Tremblay & Paul G. Sorenson, 2nd Edition, McGraw Hill, 2013
4. Data Structures using C - A M Tenenbaum, PHI, 1989
5. Data Structures and Program Design in C - Robert Kruse, 2nd edition, PHI, 1996

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