

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

**SEMESTER - III**

|                                      |               |                   |           |
|--------------------------------------|---------------|-------------------|-----------|
| <b>Subject Code</b>                  | <b>17CS33</b> | <b>IA Marks</b>   | <b>40</b> |
| <b>Number of Lecture Hours/Week</b>  | <b>04</b>     | <b>Exam Marks</b> | <b>60</b> |
| <b>Total Number of Lecture Hours</b> | <b>50</b>     | <b>Exam Hours</b> | <b>03</b> |

**CREDITS - 04**

**Module -1**

**Teaching Hours**

**10 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

**Module -2**

**10 Hours**

**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

**Module - 3**

**10 Hours**

**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

**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.

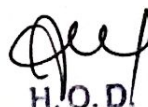
The students will have to answer 5 full questions, selecting one full question from each module.

**Text Books:**

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

**Reference Books:**

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



H.O.D.

Dept. Of Computer Science & Engineering  
Alva's Institute of Engg. & Technology  
Mijar, MOODBIDRI - 574 225