DATA STRUCTURES AND APPLICATIONS
[Revised Credit System]
(Effective from the academic year 2018-19)
SEMESTER - III

Subject Code	**CSE 2152**	**IA Marks**	**50**
Number of Lecture Hours/Week	**04**	**Exam Marks**	**50**
Total Number of Lecture Hours	**48**	**Exam Hours**	**03**

CREDITS - 04

Course objectives: This course will enable students to

- Explain fundamentals of data structures and their applications essential for programming/problem solving
- Analyze Linear Data Structures: Stack, Queues, Lists
- Analyze Non-Linear Data Structures: Trees
- Assess appropriate data structure during program development/Problem Solving Application

Module -1	**Teaching Hours**
INTRODUCTION: Accessing variables through pointers, pointer declaration and definition, initialization of pointer variables, pointers for inter function communication, pointers to pointers, Arrays and pointers, pointer arithmetic and arrays, passing an array to a function, memory allocation functions, array of pointers, Type Definition, Enumerated types, Structures, Unions. **RECURSION**: Algorithm Specification, Introduction, Recursive algorithm, Examples using system stack **Text Book 1:** Chapter 10: 10.1-10.3, Chapter 11: 11.1-11.5, Chapter 12: 12.1-12.4 **Text Book 2:** Chapter 1: 1.3	**10 Hours**
Module -2	
STACKS, QUEUES AND THEIR APPLICATIONS: Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues using Dynamic Arrays, Evaluation of Expression, Infix, Postfix and Prefix expressions and their conversions, Multiple stacks and queues, Priority Queues and their Representation, Input/Output Restricted Queues. **Text Book 2:** Chapter 3: 3.1 – 3.4, 3.6-3.7	**10 Hours**

Module – 3	
LINKED LISTS AND THEIR APPLICATIONS: Singly Linked List and Chains, Representing Chains in C, Linked Stacks and Queues, Polynomials, Additional List Operations, Doubly Linked Lists, Circular Linked Lists, Linked Lists with Header Node, Sparse Matrices, Applications using linked lists. **Text Book 2:** Chapter 4: 4.1 – 4.5, 4.7-4.8	**14 Hours**
Module-4	
TREES AND THEIR APPLICATIONS: Terminology, Representation of Trees, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Threaded Binary Trees, Binary Search Trees-Definition, Searching a Binary Search Tree, Inserting into and Deletion from Binary Search Tree, Introduction to the concepts of Optimal Binary Search Trees, Red-Black Trees, Multiway Search Trees, B-Trees. **Text Book 2:** Chapter 5: 5.1-5.4.2, 5.5, 5.7.1-5.7.4, Chapter 10: 10.1, 10.3, Chapter 11: 11.1- 11.2	**14 Hours**

Course outcomes:

After studying this course, students will be able to:

1. Associate real world representation of information using structures and recursions.
2. Solve real world problems using concepts like queues and stacks.
3. Understand and solve real world problems using linked list concepts.
4. Analyze Non-Linear Data Structures such as Trees.
5. Choose the appropriate data structure for solving real world problems.

Text Books:

1. Behrouz A. Forouzan, Richard F. Gilberg, *A Structured Programming Approach Using C,(3e)*, Cengage Learning India Pvt. Ltd, India, 2007.
2. Ellis Horowitz, Sartaj Sahni, Susan Anderson and Freed, *Fundamentals of Data Structures in C*, (2e), Silicon Press, 2007.

Reference Books:

1. Richard F. Gilberg, Behrouz A. Forouzan, *Data structures, A Pseudocode Approach with C,* (2e), Cengage Learning India Pvt. Ltd, India , 2009.
2. Tenenbaum Aaron M., Langsam Yedidyah, Augenstein Moshe J., *Data structures using C,* Pearson Prentice Hall of India Ltd., 2007.
3. Debasis Samanta, *Classic Data Structures*, (2e), PHI Learning Pvt. Ltd., India, 2010.