DATA STRUCTURES

II Year I Semester :CSE/ IT/CSIT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A5CS03	ESC	3	1	-	4	30	70	100

COURSE OBJECTIVES:

1. Impart the basic concepts of structures, pointers and data structures.
2. Understand concepts linked lists and their applications.
3. Understand basic concepts about stacks, queues and their applications.
4. Understand basic concepts of trees, graphs and their applications.
5. Enable them to write algorithms for sorting and searching.

COURSE OUTCOMES

At the end of the course, student will be able to:

1. Use arrays, pointers and structures to formulate algorithms and programs.
2. Design and implement applications of Linked List.
3. Design and implement Stack ADT using Array and Linked List.
4. Design and implement Queue ADT using Array and Linked List.
5. Solve problems involving graphs and trees.
6. Analyze searching and sorting techniques based on time and space complexity.

UNIT-I INTRODUCTION TO DATA STRUCTURES

Introduction to Structures - Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, self-referential structures, Pointer – Basics, Pointer to Structure.

Introduction to Data Structures- Definition, Linear Data Structures, Non-Linear Data Structures, Representation of single, two dimensional arrays, sparse matrices and their representation.

UNIT-II Linked List

Singly Linked Lists-Operations-Insertion, Deletion, Concatenating singly linked lists, Circularly linked lists-Operations-Insertion, Deletion, Doubly Linked Lists- Operations- Insertion, Deletion.

UNIT-III STACKS

Stacks-Stack ADT, definition, operations, array and linked implementations in C,
Applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation.

UNIT-IV QUEUES

Queues-Queue ADT, definition and operations ,array and linked Implementations in C, Circular queues-array and linked implementations in C, Dequeue (Double ended queue)ADT, array and linked implementations in C.

UNIT-V SEARCHING & SORTING AND NON-LINEAR DATA STRUCTURES

Searching- Linear Search, Binary Search, **Sorting**- Bubble Sort, Insertion Sort, Selection Sort, Quick sort, Merge Sort, Comparison of Sorting methods.
Non-Linear Data Structures- Trees – Introduction, Definition, Terminology, Applications, Tree Representations- List Representation, Left Child – Right Sibling Representation. **Graphs -** Introduction, Definition, Terminology, Applications, Graph Representations- Adjacency matrix, Adjacency lists

TEXT BOOKS:

1. E. Balagurusamy, "Programming in ANSI C", McGraw Hill Education, 6th Edition, 2012.
2. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.
3. Data Structures using C, R.Thareja 2nd Edition, Oxford Press.

REFERENCE BOOKS:

1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education

WEB REFERENCES:

1. https://hackr.io/tutorials/learn-data-structures-algorithms
2. https://www.geeksforgeeks.org/fundamentals-of-algorithms/
3. https://www.udemy.com/introduction-to-algorithms-and-data-structures-in-c/
4. https://leetcode.com

E-TEXT BOOKS:

1. http://www.freetechbooks.com/algorithm-analysis-and-design-t1030.html
2. http://www.freetechbooks.com/algorithmic-problem-solving-t373.html
3. http://www.freetechbooks.com/algorithms-and-data-structures-the-basic-toolbox-t871.html

MOOC COURSE

1. https://www.coursera.org/specializations/data-structures-algorithms
2. https://onlinecourses.nptel.ac.in/noc16_cs06/preview