**: DATA STRUCTURES**

**Credits: Teaching Scheme: Hours / Week**

**SECTION– I**

**Unit 1**: **INTRODUCTION TO DATA STRUCTURES**

Array, Functions, Call by Value and Call by Reference, Recursion, structure, pointers, pointer to pointer, Pointer to array, array of pointers, pointers to function.

**(Revision of these topics, as it is already covered in PSAP)**

Introduction to Data Structures: Concept of data, Data object, Data structure, Abstract Data Types. Concept of primitive and non-primitive, linear and Non-linear, static and dynamic, persistent and ephemeral data structures.

**Unit 2**: **STACKS**

Concept of stack, stack as ADT, Implementation of stack, Concept of implicit and explicit stack, Applications of stack-(Matching Parenthesis Problem, Expression Conversion-infix to prefix, infix to postfix, postfix expression evaluation)

**Unit 3**: **QUEUES**

Concept of queues as ADT, Implementation of queue, Concept of circular queue, double ended queue, and priority queue. Applications of queues.

**SECTION– II**

**Unit 4**: **LINKED LISTS**

sequential Vs linked memory organization, singly linked list, linked implementation of stack and queue, doubly linked list, circular linked list, ordered linked list, Linked list as an ADT. Representation of polynomials using linked lists.

**Unit 5: SEARCHING AND SORTING TEHNIQUES**

Need of searching and sorting, Concept of internal and external sorting, sort stability. Searching methods: Linear and binary search algorithms their comparison. Sorting methods: Bubble, selection, insertion, merge, quick, bucket sort, Radix Sort.

**Unit 6 : ANALYSIS OF ALGORITHMS**

Analysis of algorithm: frequency count and its importance in analysis of an algorithm, Time complexity & Space complexity of an algorithm, Big 'O', ‘Ω' and 'Θ' notations, Best, Worst and Average case analysis of an algorithm

Applications of data structures, Introduction to Trees and Graphs

**Text Books:**

1.“Data Structures using C & c++”, Y. Langsam, M. Augenstin and A. Tannenbaum , Prentice Hall India, Second edition,ISBN-978-81-203-1177-0,

2.“Data Structure through C in depth”, Shrivastava & Shrivastava, BPB Publications ,Special Indian Edition, ISBN:8176567418

**Reference Books:**

1.“Data structure and program design in c”, R.L.Kruse, B.P.Leung, C.L.Tondo,Prentice Hall Of India, latest edition , ISBN 0 -13-725649-3

2.“Data Structure” , Seymour Liptsutz Tata Mc Graw Hill Publication, seventh reprint 2007,ISBN-13:978-0-07-060168-0

3.“Data Structure through C”.,Y.P. Kanetkar ,BPB publication, ISBN (978-8176567060)

**Course Outcomes:**

Upon completion of the course, post graduates will be able to –

1. To understand basics of data structures and Systemize incorporation of data structures in context with real world’s scenarios
2. Implement and demonstrate stack data structure with applications.
3. Implement and demonstrate Queue data structure with applications.
4. Formulate a solution for a given problem with linked version of data structures and capabilities.
5. Use various types of sorting and searching techniques.
6. Analyze asymptotic time complexity of an algorithm using suitable mathematical tools.