

**SYLLABUS PRESCRIBED FOR
ONE YEAR P.G. DIPLOMA IN
COMPUTER SCIENCE**

2 MCA 1 / 2 CS 1

DATA STRUCTURES & ALGORITHMS

Unit-I Data structures basics, Mathematical/algorithmic notations & functions, Complexity of algorithms, Sub-algorithms. String processing: storing strings, character data type, string operations, word processing, and pattern matching algorithms.

Unit-II Linear arrays and their representation in memory, traversing linear arrays, inserting & deleting operations, Bubble sort, Linear search and Binary search algorithms. Multidimensional arrays, Pointer arrays. Record structures and their memory representation. Matrices and sparse matrices.

Unit III Linked lists and their representation in memory, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion deletion operations on linked lists. Header linked lists, Two-way linked lists.

Unit-IV Stacks and their array representation. Arithmetic expressions: Polish notation. Quick sort, an application of stacks, Recursion. Tower of Hanoi problem. Implementation of recursive procedures by stacks, Queues. Deques. Priority queues.

Unit-V Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms using stacks, Header nodes: threads. Binary search trees, searching, inserting and deleting in binary trees. Heap and heapsort. Path length & Huffman's' algorithm. General trees.

Unit-VI Graph theory, sequential representation of graphs, Warshalls' algorithm, Linked representation, operations & traversing the graphs. Posets & Topological sorting. Insertion Sort, Selection Sort. Merging & Merge-sort, Radix sort, Hashing.

Text Book: Seymour Lipschutz: "Theory & Problems of Data Structures" (TMH)

References:

- i. Horowitz & Sahni "Data Structures" (Galgotia)
- ii. Trembly & Sorenson "Data Structures" (TMH)
- iii. Standish "Data Structures in Java" (Pearson)
- iv. Bhagat Singh & Naps "Data Structures" (TMH).

DATA STRUCTURES- LABORATORY

The sample list of program is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected out comes.

Further, C,C++ or Java may be used as the programming language.

1. Write an application to implement Tower of Hanoi Problem Algorithm.
2. Write an application to implement Abstract data type stack
3. Write an program to evaluate Post fix expression using stack
4. Write a program to implement Abstract data type queue.

5. Write a program to implement singly linked list that performs various operation in linear linked list.
6. Write a program to implement Preorder Traversal of a binary tree.
7. Write a Program to search a given element using Binary Search.
8. Write a Program to implement Selection Sort.
9. Write a Program to implement Merge Sort.
10. Write a Program to insert or search in a specified level of a stack implemented tree- structured symbol table.

1MCA 6 / 1 CS 6 COMPUTER LAB-I

This laboratory is based on the study of following software.

1. The study of Windows/Linux operating systems :
The topics to be covered include
 - 1) The study of basic commands handling files, directories, system configuration, and system calls
 - 2) Shell programming.
 - 3) General purpose utilities & editors
 - 4) Setting/resetting file attributes/modes, sharing files
 - 5) TCP/IP networking.
2. The study of spreadsheets: Creating Worksheets, Formatting cells, conditional formatting of cells and data, Use of functions, Creating Macros, Creating different types of charts.
(At least 6 exercises covering above mentioned features) Use MS-Excel or Calc from Open Office Under Linux.
3. The study of DBMS : Creating Database, Tables, Views, Queries, Creating Reports
(At least 6 exercises covering above mentioned features)

Remaining content of syllabi is as per the syllabi of 2009-10 of PGDCS
