Moodule Name: Data Structures
Paper Code: MDTS4111 (Module 2)

M. Sc. (Data Science)

Session 2022-2023

Lecture 1 – Introduction to Data Structures

Date: 18th. August'2022

Jayati Ghosh Dastidar

Email: j.ghoshdastidar@sxccal.edu

Reference Books

1. Data Structures – Seymour Lipschutz, Schaum's Outline Series, McGraw Hills
2. Fundamentals of Computer Algorithms – Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press (India) Private Limited

Road Map

Sl. No.	Topic
1	Introduction to Data Structures, Basic ideas on complexity analysis: Big-Oh, Big-Omega, Big-Theta notations.
2	Arrays – Searching and Sorting
3	Stacks
4	Queues
5	Linked Lists
6	Binary Trees, Binary Search Trees, Threaded Binary Tree, AVL Trees
7	Sets, Tuples, Dictionaries, Tries

Data Structure

- Data may be organised in many different ways.
- The logical or mathematical model of a particular organisation of data is called a data structure.
- The study of such data structures includes the following three steps:
  - Logical or mathematical description of the structure
  - Implementation of the structure on a computer
  - Quantitative analysis of the structure

Algorithm

- An algorithm is a finite number of unambiguous steps which when executed sequentially will solve a problem correctly.
- Key Points
  - Finiteness
  - Unambiguity
  - Correctness

Algorithm – Linear Search

Algorithm LINSEARCH(A, N, DATA)

Description: This Algorithm searches for the data, DATA in the Array, A of size, N. If present it returns the position of the data in the array, else it returns -1.

```
Begin
        LOC:=0
        While(LOC < N)
        Do Begin
                IF A[LOC] = DATA
                        Return LOC
                END IF
                LOC:=LOC + 1
        While End
        Return -1
End
```

Analysis of the Algorithm

- Necessity
- Methods – Complexity (Asymptotic Notations)
- Dominant statement(s)
- Counting Frequency

THANKYOU !!!