IVA011 - Data Science with Python

Course outcomes:

- Examine Python syntax and semantics and apply Python flow control and functions.
- Create, run and manipulate Python Programs using core data structures like Lists,
- Apply Dictionaries and use Regular Expressions.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Master object-oriented programming to create an entire python project using objects and classes.

Syllabus:

UNIT I

Oops Concepts

Class, object, constructors, types of variables, types of methods. Inheritance: single, multiple, multi-level, hierarchical, hybrid, Polymorphism: with functions and objects, with class methods, with inheritance, Abstraction: abstract classes.

UNIT II

Data Structures – Definition, Linear Data Structures, Non-Linear Data Structures

Python Specific Data Structures: List, Tuples, Set, Dictionaries, Comprehensions and its Types, Strings, slicing.

UNIT III

Arrays-Overview, Types of Arrays, Operations on Arrays, Arrays vs List.

Searching- Linear Search and Binary Search.

Sorting – Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort.

UNIT IV

Linked Lists–Implementation of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists.

Stacks - Overview of Stack, Implementation of Stack (List & Linked list), Applications of Stack **Queues**: Overview of Queue, Implementation of Queue (List & Linkedlist), Applications of Queues, Priority

Queues.

UNIT V

Graphs -Introduction, Directed vs. Undirected Graphs, Weighted vs Unweighted Graphs, Representations, Breadth First Search, Depth First Search.

Trees - Overview of Trees, Tree Terminology, Binary Trees: Introduction, Implementation, Applications. Tree Traversals, Binary Search Trees: Introduction, Implementation, AVL Trees: Introduction, Rotations, Implementation.

Reference Text Books:

1. Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7, 2nd Edition by Dr. Basant Agarwal, Benjamin Baka.
2. Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.
3. Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller and David L. Ranum.
4. Core Python Programming -Second Edition,R. Nageswara Rao, Dreamtech Press