# 19CS1201 - PYTHON AND DATA STRUCTURES

**(Common to CSE & IT)**

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| Course Category: | Core | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Basic mathematical knowledge to solve problems and programming | Sessional Evaluation:  Univ. Exam Evaluation:  Total Marks: | 40  60  100 |
| Objectives: | Students undergoing this course are expected:   1. To learn the fundamentals of Python constructs 2. To develop various simple programs using Python 3. To define Python functions, exceptions and various other features 4. To explore features of data structures and its implementations using Python | | |

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| Course Outcomes | Upon successful completion of the course, the students will be able to: | |
| CO1 | Learn the basic building blocks of Python |
| CO2 | Understand the flow of execution, exception handling mechanism and built-in  functions for application development |
| CO3 | Study Dictionaries, Tuples, Sets. And their applications |
| CO4 | Explore different kinds of sorting and searching techniques |
| CO5 | Learn the essentials of stack, queue and supporting implementation. |
| CO6 | Implement Linked structure and Fundamentals of trees. |
| Course Content | UNIT-I  **Python Basics**: Identifiers, Keyword, Statements and Expressions, variables, Comments, Significance of Indentation, Dynamic and Strongly Typed Language**.**  **Operators:** Basic Operators available in Python, Precedence and Associativity, type() function and Is operator.  **Data Types:** Basic Data Types, Type Conversions, Strings: creating and storing strings, Basic String Operations.  **Input and output**: Reading values from the user and printing the values.  UNIT-II  **Conditional Statements**: if, if…else, if..elif…else, nested if.  **Loops** – while, for, continue and break statements, Exception Handling, Functions.  **Slicing and Joining of Strings:** String methods, Formatting Strings.  **Lists**: creation, Indexing and Slicing, Built-In functions and Methods, *del* statement.  UNIT-III  **Dictionaries**: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Methods, *del* Statement.  **Tuples**: Creation, basic operations, Indexing and slicing, Built-In functions, Methods, Relation of Tuples to Lists and Dictionaries, *Zip()* Function.  **Sets :**Set Methods, Frozen set.  UNIT-IV  **Data structures Basics:** Data structures, Data structure operations. [Ref. Book-1]. **Searching:** The Linear Search, The Binary Search, **Sorting:** Bubble Sort, Selection Sort, Insertion Sort.  UNIT-V  **Linked Structures:** Introduction, The Singly Linked List-Traversing the Nodes, Searching for a Node, Prepending Nodes and removing nodes.  **Binary Trees:** The Tree Structure**, The Binary Tree:** Properties, implementation, Tree Traversals.  UNIT-VI  **Stacks:** The Stack ADT**, Implementing the Stack:** Using a Python List, Using a Linked List**, Stack Applications:** Balanced Delimiters, Evaluating Postfix Expressions. **Queues:** The Queue ADT**, Implementing the Queue:** Using a Python  List, Using a Linked List. | |
| Text Books &  References  Books | **TEXT BOOKS**   1. Gowrishankar. S, Veena.A, “ Introduction to Python Programming”, CRC Press, Taylor and Francis group, 2019. 2. Rance D. Necais, Data Structures and Algorithms Using Python, Fourth Edition, JONN-WILEY& SONS INC,2011.   **REFERENCE BOOKS**   1. SEYMOUR LIPCHUTZ, Data Structures with C, Tata McGraw Hill Education Private Limited,2010 2. Bradley N. Miller, David L. Ranum, Problem Solving with Algorithms and Data Structures Using Python SECOND EDITION. 3. Presis B R, Data structures and algorithms in Python. | |
| E-Resources | 1. [https://nptel.ac.in/courses](https://nptel.ac.in/courses\) 2. <https://freevideolectures.com/university/iitm> | |