# 20CS12P1 - DATA STRUCTURES USING PYTHON LABORATORY

(Common to CSE, IT and AI&DS)

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| **Course Category:** | Professional Core | **Credits:** | 1.5 |
| **Course Type:** | Practical | **Lecture - Tutorial - Practical:** | 0-0-3 |
| **Prerequisite:** | Fundamentals of Computers and basic Mathematics Knowledge in programming languages like C and Python and data structures. | **Sessional Evaluation:**  **Univ. Exam Evaluation:**  **Total Marks:** | 40  60  100 |
| **Objectives** | * To learn and practice the basic fundamental blocks of Python Programming. * Experience the use & functionality of Data structures. | | |

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| **Course Outcomes** | Upon completion of the course, students will be able to gain knowledge on Python programming, and able to solve problems using data structures and feel confident to apply the techniques in real life problems they encounter. | |
| **Course Content** | 1. | 1. Write a Python program to check whether the given year is leap year or not. 2. Develop a Python program to check whether the given number is palindrome. |
| 2. | 1. Write a Python program to print ‘n terms of Fibonacci series using recursion. 2. Implement matrix multiplication. |
| 3. | 1. Using Python, demonstrate use of slicing in string. 2. Using Python, demonstrate the use of list & related functions. |
| 4. | 1. Write a Python program to demonstrate use Dictionary& related functions. 2. Write a Python program to demonstrate use tuple, set & related functions. |
| 5. | 1. Develop a Python program to demonstrate constructors. 2. Write a Python program to demonstrate inheritance. |
| 6. | Implement the following search methods   1. Linear Search b) Binary Search |
| 7. | Write a program to implement the sort techniques   1. Bubble sort b) Quick sort |
| 8. | Write a program that uses functions to perform the following   1. Create a singly linked list of integers 2. Delete a given integer from the above linked list 3. Display the contents of the above list after deletion. |
| 9. | Write a program that uses a stack operation to convert a given infix expression into its postfix equivalent, implement the stack using an array. |
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| 10. | Write a program that uses functions to perform the following   1. Create a binary search tree (BST) of integers 2. Traverse the above BST in Postorder. 3. Traverse the above BST in Inorder. |
| **Text Books and References** | Text Books:   1. Gowrishankar. S, Veena. A, “Introduction to Python Programming”, CRC Press, Taylor and Francis group, 2019. 2. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705. 3. Computer Programming and Data Structures by E. Balagurusamy, 4/e, McGraw Hill. 4. Data Structures and Algorithms – concepts, Techniques and Applications by G A V Pai, McGraw Hill. | |
| Reference Books:   1. Martin C. Brown, “The Complete Reference: Python”, McGraw-Hill, 2018. 2. R. Nageswara Rao, “Core Python Programming”, 2nd edition, Dreamtech Press, 2019Data structures Algorithms and Applications, S. Sahni, University press (India) pvt ltd, 2nd edition, 3. C Programming & Data Structures, B. A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning. 4. An Introduction to Data structures with applications: Tremblay J P and Sorenson P G | |
| **E-Resources** | 1. <https://Wiki.python.org/moin/WebProgrammingBooks> 2. <https://realpython.com/tutorials/web-dev/> 3. <https://nptel.ac.in/courses> | |

**CO-PO Mapping:** 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 3 | 2 | 2 | 3 | - | 2 | - | 2 | 2 | 3 | 3 |