Curriculum Plan

Paper Name: **Data Structures using Python**
Class Type: Generic elective- Computer Science
Semester: VI
Teacher Name: Ms. Neha Singh

S.N.	Schedule (Approximate)	Topic
1.	January	**Unit 1:** **Growth of Functions, Recurrence Relations:** Functions used in analysis, asymptotic notations, asymptotic analysis, solving recurrences using substitution method, recursion tree, Master Theorem.
2.	February	**Unit 2:** **Arrays:** array operations, applications, sorting, two-dimensional arrays, dynamic allocation of arrays **Linked Lists:** Linked Lists: singly linked lists, doubly linked lists, circularly linked lists, time complexity analysis of operations **Stacks:** stack as an ADT, implementing stacks using arrays, implementing stacks using linked lists, applications of stacks; time complexity analysis of operations Assignment/Presentations/Test (Unit 1 & 2)
3.	March	**Unit 2:** **Queues:** queue as an ADT, implementing queues using arrays, implementing queues using linked lists **Deques:** double-ended queue as an ADT, time complexity analysis of operations.
		Unit 3: **Recursion:** Recursive functions, linear recursion, binary recursion. **Unit 4:** **Trees:** definition and properties Assignment/ Presentations/ Tests (Unit 2 & 3)

4.	April	**Unit 4:** **Binary trees**: definition and properties, traversal of binary trees and their time complexity analysis. **Binary Search Trees:** insert, delete (by copying), search operations, time complexity analysis of these operations; **Balanced Search Trees**: motivation and introduction, AVL Trees Assignment/ Presentations/ Tests (Unit 4 & 5) **Unit 5** **Binary Heaps:** motivation and introduction, heapsort, building heaps **REVISION** Mock Practical/ Viva/ Mock Exam

Essential/recommended readings

1. Goodrich, M.T, Tamassia, R., & Mount, D., *Data Structures and Algorithms in Python,* Wiley, 2021
2. Cormen, T.H., Leiserson, C.E., Rivest, R. L., Stein C. *Introduction to Algorithms*, 4th edition, Prentice Hall of India, 2022.
3. Taneja, S. and Kumar, N., Python Programming: A modular approach, Pearson, 2017.

Additional References

(i) Sahni, S., *Data Structures, Algorithms and applications in C++*, 2nd edition, Universities Press, 2011.
(ii) Langsam Y., Augenstein, M. J., & Tanenbaum, A. M. *Data Structures Using C and C++*, Pearson, 2009.
(iii) Drozdek, A., *Data Structures and Algorithms in Python*, 1st edition, Cengage Learning, 2024.