

## B.Sc. (Prog.)/B.A (Prog.) Computer Science II Semester (NEP)

### Data Structures Guidelines

S.No.	Topic	Reference	Contents
1	Unit 1 - Growth of Functions, Recurrence Relations	[1] [2]	Ch-4 4.2: 4.2.1-4.2.4  4.4 (till page 98), 4.5(till page 103)
2	Unit 2 - Arrays, Linked Lists, Stacks, Queues, Deques  Unit 3 - Sorting	[1] [2]  [1]  [3]	Ch-3: 3.1 (till page 112) 8.2  3.2: 3.2.1-3.2.3 3.3: 3.3.1-3.3.2 3.4 (till page 129) ch-5: 5.1: 5.1.1, 5.1.4 (to be discussed without templates), 5.1.5 5.2: 5.2.1, 5.2.4 5.3.1  Fig 4.10 (to be discussed without templates)
3	Unit 4 - Recursion	[1]	ch-3: 3.5 - page 134-135, 3.5.1 (excluding tail recursion) – 3.5.2(till page 145)
4	Unit 5 - Trees, Binary trees	[3]	ch-6: 6.1, 6.4 (upto page 230)
5	Unit 6 - Binary Search Trees, Balanced Search Trees	[3]	ch-6: 6.3 (upto page 222), 6.5 (excluding figure 6.23, 6.24), 6.6 (till page 248 - excluding 6.6.1 and figure 6.32) 6.7(upto page 250)
6	Unit 7 - Binary Heap, Priority Queue	[2]	ch-6: 6.1, 6.5 (upto page 173)

#### Note:

1. Exclude proofs of theorems, lemmas and corollaries.
2. Portions related to STL, if mentioned, are to be omitted.

#### References

1. Goodrich, M.T, Tamassia, R., & Mount, D., Data Structures and Algorithms Analysis in C++, 2nd edition. Wiley, 2011.
2. Cormen, T.H., Leiserson, C.E., Rivest, R. L., Stein C. Introduction to Algorithms, 4th edition, Prentice Hall of India, 2022.
3. Drozdek, A., Data Structures and Algorithms in C++, 4th edition, Cengage Learning, 2012.

#### 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.

### **Practical List**

1. Implement matrix addition and multiplication.
2. Implement Insertion sort.
3. Implement following recursive functions:
  - a. Factorial of a number
  - b.  $N^{\text{th}}$  fibonacci number
4. Implement singly linked lists.
5. Implement stack data structure and its operations using arrays.
6. Implement stack data structure and its operations using singly linked lists.
7. Implement queue data structure and its operations using arrays.