

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Bachelor of Technology				Branch/Spec.	Computer Science and Business Systems			
Semester	II				Version	1.0.0.0			
Effective from Academic Year	2026-27				Effective from the batch admitted in	July 2026			
Course Code	2PCC-CB-1102				Course Name	Data Structures and Algorithms			
Course Category	Professional Core Courses (PCC)								
Teaching Scheme					Examination scheme (Marks)				
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	2	0	5	Theory	50	50	100
Hours	3	0	4	0	7	Practical	25	25	50
Pre-requisites:									
Not Applicable									
Course Outcomes									
Cos	Description								
CO1	Explain fundamental concepts of algorithms including algorithm specification, recursion, performance analysis, asymptotic notations (Big-O, Ω , Θ), time-space trade-offs, programming style, testing, and data abstraction.								
CO2	Apply linear data structures such as arrays, stacks, queues, and linked lists for efficient data representation and problem solving.								
CO3	Analyze non-linear data structures including trees and graphs with respect to their representations, operations, traversal techniques, and applications.								
CO4	Evaluate and select appropriate searching, sorting, hashing, file organization, and graph traversal techniques based on problem requirements and computational complexity.								
Theory Syllabus									
Unit	Content								Hours
1	Basic Terminologies and Introduction to Algorithm & Data Organisation: Algorithm specification, Recursion, Performance analysis, Asymptotic Notation - The Big-O, Omega and Theta notation, Programming Style, Refinement of Coding - Time-Space Trade Off, Testing, Data Abstraction								06
2	Linear Data Structure: Array, Stack, Queue, Linked-list and its types, Various Representations, Operations & Applications of Linear Data Structures								12
3	Non-linear Data Structure: Trees (Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, Splay Tree) and Graphs (Directed, Undirected), Various Representations, Operations & Applications of Non-Linear Data Structures								10
4	Searching and Sorting on Various Data Structures: Sequential Search, Binary Search, Comparison Trees, Breadth First Search, Depth First Search Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heapsort, Introduction to Hashing								11
5	File: Organisation (Sequential, Direct, Indexed Sequential, Hashed) and various types of accessing schemes.								03
6	Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.								03
Practical and Self Learning Content									
1. Towers of Hanoi using user defined stacks. 2. Reading, writing, and addition of polynomials. 3. Line editors with line count, word count showing on the screen.									

4. Trees with all operations.
5. All graph algorithms.
6. Saving / retrieving non-linear data structure in/from a file.
Text Books
1 Fundamentals of Data Structures, E. Horowitz, S. Sahni, S. A-Freed, Universities Press
2 Data Structures and Algorithms, A. V. Aho, J. E. Hopperoft, J. D. Ullman, Pearson
Reference Books
1 The Art of Computer Programming: Volume 1: Fundamental Algorithms, Donald E. Knuth.
2 Introduction to Algorithms, Thomas, H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, The MIT Press.
3 Open Data Structures: An Introduction (Open Paths to Enriched Learning), (Thirty First Edition), Pat Morin, UBC Press.
ICT/MOOCs Reference
1 https://nptel.ac.in/courses/106102064
2 https://nptel.ac.in/courses/106103069

Mapping of COs, POs, and PSOs														
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	3	3	2	0	2	0	0	0	0	0	2	3	1	2
CO2	3	3	3	2	2	0	0	0	0	0	2	3	2	2
CO3	3	3	3	2	2	0	0	0	0	0	2	3	2	3
CO4	3	3	3	2	3	0	0	0	0	0	2	3	2	3

Bloom's Taxonomy Level				
Unit	Unit Title	Aligned COs	Learning Hours	BTL Level
1	Basic Terminologies and Introduction to Algorithm & Data Organisation	CO3, CO4	06	A,N
2	Linear Data Structure	CO1, CO3	12	A
3	Non-linear Data Structure	CO2, CO3	10	A,N
4	Searching and Sorting on Various Data Structures	CO4	11	A,N
5	File	CO4	03	N
6	Graph	CO4	03	N

Note:

- Version 1.0.0.0 (First Digit= New syllabus/Revision in Full Syllabus, Second Digit=Revision in Teaching Scheme, Third Digit=Revision in Exam Scheme, Forth Digit= Content Revision)
- 1 Hour Lecture = 1 Credit, 1 Hour Tutorial = 1 Credit, 2 Hours Practical = 1 Credit, 2 Hours Internship/Project/Seminar = 1 Credit
- Bloom's Taxonomy Level (BTL): R: Remember, U: Understand, A: Apply, N: Analyze, E: Evaluate, and C: Create