perplexity

divide all the small subtopics

Certainly! Here’s a detailed breakdown, dividing your topics into all their subtopics. Each item is separated for clarity.

a. Introduction

Main Topic	Subtopics
Need for Data Structure	- Importance of data structures
Concepts	- Data - Data Structure
Abstract Data Type (ADT)	- Meaning and examples
Data Type	- Primitive vs. non-primitive data types
Algorithm vs Program	- Definitions - Key differences
Pseudo-code	- Structure - Common conventions
Algorithm Efficiency	- Time complexity - Space complexity
Algorithm Analysis	- Empirical vs asymptotic analysis
Order Notations	- Big O - Big Theta - Big Omega

b. Array

Main Topic	Subtopics
Representations	- Row-major order - Column-major order
Sparse Matrix	- Definition - Storage techniques - Implementation - Usage
Polynomial Representation	- Array representation of polynomials

c. Linked List

Main Topic	Subtopics
Types	- Singly linked list - Circular linked list - Doubly linked list
Polynomial Representation	- Linked list representation of polynomials
Applications	- General use cases

d. Stack and Queue

Main Topic	Subtopics
Stack	- Implementation using array - Implementation using linked list - Applications
Queue	- Linear queue - Circular queue - Deque (double-ended queue)
Queue Implementations	- Using array (linear & circular) - Using linked list
Applications	- General use cases

e. Recursion

Main Topic	Subtopics
Principles	- Base case and recursive case - Stack usage in recursion
Recursion vs Iteration	- Differences and similarities
Tail Recursion	- Definition and significance
Applications	- Tower of Hanoi - Eight Queens Puzzle

f. Trees

Main Topic	Subtopics
Basic Terminologies	- Node, root, child, parent, leaf, level, height, depth, degree, etc.
Forest	- Definition and example
Tree Representation	- Using array - Using linked list
Binary Tree	- Definition - Properties - Types (full, complete, etc.)

Main Topic	Subtopics
Binary Tree Traversal	- Pre-order - In-order - Post-order
Threaded Binary Tree	- Left, right, full - Non-recursive traversals
Expression Tree	- Construction and evaluation
Binary Search Tree (BST)	- Creation - Insertion - Deletion - Searching
Height-balanced Tree (AVL Tree)	- Concepts - Insertion (with examples) - Deletion (with examples)

g. Graphs

Main Topic	Subtopics
Definitions & Concepts	- Directed/Undirected - Weighted/Unweighted - Sub-graph - Degree - Cut-vertex (articulation point) - Pendant node - Clique - Complete graph - Connected components (strong, weak) - Path - Shortest path - Isomorphism
Graph Representation (Storage)	- Adjacency matrix - Adjacency list - Adjacency multilist
Graph Traversal & Connectivity	- Depth First Search (DFS) - Breadth First Search (BFS) - Edge types: tree-edge, back-edge, cross-edge, forward-edge
Algorithms & Applications	- DFS & BFS Applications - Minimal Spanning Tree (MST): Prim’s Algorithm (greedy method) - B-trees (basic operations)

h. Sorting Algorithms

Main Topic	Subtopics
Bubble Sort	- Standard - Optimizations
Insertion Sort	

Main Topic	Subtopics
Shell Sort	
Selection Sort	
Merge Sort	
Quick Sort	
Heap Sort	- Max heap - Application as priority queue
Radix Sort	

i. Searching Algorithms

Main Topic	Subtopics
Sequential Search	
Binary Search	
Interpolation Search	

If you want the above in a fully formatted table, here it is as a **multi-row table**:

Complete Breakdown Table

Main Topic	Subtopics
Introduction	- Need for Data Structure - Data - Data Structure - Abstract Data Type (ADT) - Data Type - Algorithm vs Program - Pseudo-code - Algorithm Efficiency (Time/Space) - Algorithm Analysis - Order Notations (Big O, Theta, Omega)
Array	- Row-major order - Column-major order - Sparse matrix (definition, storage, implementation, usage) - Array representation of polynomials
Linked List	- Singly linked list - Doubly linked list - Circular linked list - Linked list representation of polynomials - Applications
Stack	- Implementation via array - Implementation via linked list - Applications

Main Topic	Subtopics
Queue	- Linear queue - Circular queue - Deque - Queue via array (linear/circular) - Queue via linked list - Applications
Recursion	- Principles/base case - Stack use in recursion - Recursion vs iteration - Tail recursion - Applications: Tower of Hanoi, Eight Queens Puzzle
Trees	- Terminologies - Forest - Tree representation (array, linked list) - Binary tree (types, traversals) - Threaded binary tree (left/right/full, non-recursive traversal) - Expression tree - Binary search tree (creation, insertion, deletion, search) - AVL tree (height-balanced, insertion and deletion with examples)
Graphs	- Definitions and concepts (directed/undirected, weighted/unweighted, sub-graph, degree, cut-vertex, pendant node, clique, complete graph, connected components, path, shortest path, isomorphism) - Graph representation: adjacency matrix, adjacency list, adjacency multilist - Graph traversal and connectivity: DFS, BFS, edge types (tree/back/cross/forward), applications - Minimal spanning tree (Prim's), B-tree operations
Sorting	- Bubble sort & optimizations - Insertion sort - Shell sort - Selection sort - Merge sort - Quick sort - Heap sort (max heap, priority queue) - Radix sort
Searching	- Sequential search - Binary search - Interpolation search

Let me know if you want individual tables for each main topic or a particular style (like CSV, markdown, etc.)!