DSA Topic Selection Sheet (Detailed)

Basics – Service Based Companies

Topic	When to Use	Why It Works	Common Signals
Arrays	Continuous data with index-based access.	Allows O(1) access and simple traversal.	subarray, index, range
Strings	Problems involving characters or text.	Character-wise processing is easier.	palindrome, anagram
Binary Search	Sorted data or monotonic answer space.	Reduces search space to log N.	first, last, minimum possible
Stack	Nearest previous/next dependency.	LIFO naturally fits these patterns.	next greater, balanced
Queue	Order-based processing required.	FIFO preserves processing order.	level order, simulation

Intermediate – Startups / Mid Product

Topic	When to Use	Why It Works	Common Signals
Two Pointers	Pairs or shrinking window in arrays.	Avoids nested loops.	pair sum, sorted array
Sliding Window	Continuous subarray or substring.	Avoids recomputation of window.	longest window
HashMap	Fast lookup or frequency counting.	O(1) average access time.	frequency, duplicates
Linked List	Frequent insertion or pointer logic.	No shifting cost.	reverse, cycle
Prefix Sum	Multiple range sum queries.	Constant-time range calculation.	sum from i to j

Advanced – Product Companies

Topic	When to Use	Why It Works	Common Signals
Heap	Need top K elements dynamically.	Efficient min/max extraction.	kth largest
Trees	Hierarchical relationships.	Recursive structure matches problem.	LCA, diameter
Graphs	Connectivity or traversal.	BFS/DFS explores relationships.	islands, path exists
Bit Manipulation	Optimize space or time.	Uses bit-level tricks.	xor, single number

FAANG Level – Advanced

Topic	When to Use	Why It Works	Common Signals
Dynamic Programming	Overlapping subproblems with optimal result.	Stores results to avoid recomputation.	max, min, number of ways
DP on Trees	Decisions depend on children.	Postorder combines child states.	include/exclude
Tries	Prefix-based string search.	Shared prefixes reduce time.	starts with

Topic	When to Use	Why It Works	Common Signals
Segment Tree	Range query with updates.	Log N operations.	range sum/max
Union Find	Dynamic connectivity problems.	Fast union and find.	components, cycle