🗓️ Day-Wise DP Plan

🟩 Day 1 – Introduction to Recursion & Memoization

- 🔸 **Topics**: Recursion, Top-Down DP
- 🧩 **Problems** :
    1. Fibonacci Number – LeetCode **509**
    2. Climbing Stairs – LeetCode **70**
    3. Frog Jump (Striver DP 3)
    4. Frog Jump with K distance (Striver DP 4)
    5. Tribonacci Number – LeetCode **1137**
    6. Decode Ways – LeetCode **91**
    7. Factorial using recursion + memorization
    8. Climbing stairs with variable jumps
    9. Recursive sum with modulo constraints

🟩 Day 2 – Tabulation & Space Optimization

- 🔸 **Topics**: Bottom-Up DP, Space Optimization
- 🧩 **Problems** :
    1. House Robber – LeetCode **198**
    2. House Robber II – LeetCode **213**
    3. Maximum Sum of Non-Adjacent Elements (Striver DP 5)
    4. Ninja Training (Striver DP 7)
    5. Min Cost Climbing Stairs – LeetCode **746**
    6. Paint House – LeetCode **256**
    7. Jump Game II – LeetCode **45**
    8. Jump to end of array with min jumps
    9. Paint N houses with no adjacent color same

🟩 Day 3 – Grid-Based DP

- 🔸 **Topics**: 2D DP
- 🧩 **Problems** :
    1. Unique Paths – LeetCode **62**
    2. Unique Paths II – LeetCode **63**
    3. Minimum Path Sum – LeetCode **64**
    4. Triangle – LeetCode **120**
    5. Dungeon Game – LeetCode **174**
    6. Maximum Path Sum in Matrix (Striver DP 13)
    7. Count Unique Paths with Obstacle
    8. Pathfinding with blocked cells
    9. DP in matrix with conditionals

🟩 Day 4 – Subset Sum & 0/1 Knapsack

- 🔸 **Topics**: DP on Subsets, 0/1 Knapsack
- 🧩 **Problems** :
    1. Subset Sum Equals Target (Striver DP 16)
    2. Equal Subset Partition – LeetCode **416**
    3. 0/1 Knapsack (Striver DP 19)
    4. Count Subsets with Sum K (Striver DP 17)
    5. Target Sum – LeetCode **494**
    6. Partition to K Equal Sum Subsets – LeetCode **698**
    7. Perfect Sum Problem (GFG)
    8. Maximize knapsack value with item constraints
    9. Count partitions for target sum

🟩 Day 5 – Advanced Knapsack Patterns

- 🔸 **Topics**: Infinite Supply, Coin Change
- 🧩 **Problems** :
    1. Rod Cutting (Striver DP 23)
    2. Coin Change II – LeetCode **518**
    3. Coin Change I – LeetCode **322**
    4. Minimum Subset Sum Difference (Striver DP 18)
    5. Minimum number of coins (GFG variation)
    6. Count combinations for amount N
    7. Bounded Knapsack custom test case
    8. DP on coin denominations
    9. Minimize coins to make a target

🟩 Day 6 – Longest Common Subsequence (LCS)

- 🔸 **Topics**: DP on Strings
- 🧩 **Problems** :
    1. Longest Common Subsequence – LeetCode **1143**
    2. Print LCS (Striver DP 26)
    3. Longest Palindromic Subsequence – LeetCode **516**
    4. Shortest Common Supersequence (Striver DP 27)
    5. Longest Repeating Subsequence (Striver DP 30)
    6. Print SCS
    7. Practice LCS variant on HackerRank
    8. Merge two strings while keeping both as subsequences
    9. Palindrome insertions/deletions

🟩 Day 7 – Applications of LCS

- 🔸 **Topics**: Advanced DP on Strings
- 🧩 **Problems** :
    1. Edit Distance – LeetCode **72**
    2. Distinct Subsequences – LeetCode **115**
    3. Interleaving String – LeetCode **97**
    4. Minimum Insertions to Make Palindrome (Striver DP 29)
    5. Wildcard Matching – LeetCode **44**
    6. Regex Matching – LeetCode **10**
    7. DP Pattern Matching (Regex)
    8. Pattern matching with wildcards
    9. Transform A to B with min operations

🟩 **Day 8 – DP on Stocks**

- 🔸 **Topics**: Transaction-based DP
- 🧩 **Problems** :
    1. Best Time to Buy and Sell Stock with Fee – LeetCode **714**
    2. Best Time to Buy and Sell Stock III – LeetCode **123**
    3. Best Time to Buy and Sell Stock IV – LeetCode **188**
    4. Best Time with Cooldown – LeetCode **309**
    5. Best Time to Buy and Sell Stock II – LeetCode **122**
    6. Stock Span Problem
    7. Practice custom stock problem (2 states)
    8. Profit maximization with limit on transactions
    9. Fee/cooldown-based stock problems

🟩 **Day 9 – LIS & Matrix Chain Multiplication**

- 🔸 **Topics**: DP on LIS, MCM

- 🧩 **Problems** :
    1. Longest Increasing Subsequence – LeetCode **300**
    2. Number of LIS – LeetCode **673**
    3. Matrix Chain Multiplication (Striver DP 48)
    4. Burst Balloons – LeetCode **312**
    5. Palindrome Partitioning II – LeetCode **132**
    6. Minimum Cost to Merge Stones – LeetCode **1000**
    7. Longest Bitonic Subsequence
    8. Array merging with minimal cost
    9. Partitioning array optimally using DP

🧠 **DP with Bitmasking – Must Practice Problems**

#	Problem Name	LeetCode / Platform	Problem Number / Link	Difficulty
1	**Partition to K Equal Sum Subsets**	LeetCode	698	Medium
2	**Matchsticks to Square**	LeetCode	473	Medium
3	**Travelling Salesman Problem (TSP)**	GFG / Custom	Link	Hard
4	**Minimum Path Sum with Visiting All Cities (TSP variant)**	LeetCode	943	Hard
5	**Maximum AND Sum of Array**	LeetCode	2009	Hard
6	**Count of Subsets with Given XOR**	GFG	Link	Medium
7	**Minimum Cost to Connect Two Groups of Points**	LeetCode	1595	Hard
8	**Number of Ways to Wear Different Hats to Each Person**	LeetCode	1434	Hard

---

📌 **Common Use-Cases in Bitmask DP:**

- **Subset representation** using bitmask (for inclusion/exclusion).
- **Memoization with mask + index** as state: dp(mask, i)
- Used when total combinations are 2^n (typically n ≤ 16–20).
- Commonly applied in:
    - **TSP (Travelling Salesman Problem)**

- **Assignment Problems**
- **Subset Sum with constraints**
- **Permutation-based problems with constraints**