**Dynamic Programming :**

|  |  |  |
| --- | --- | --- |
|  | **Description** | **Status** |
|  | Ugly numbers |  |
|  | Fibonacci numbers |  |
|  | nth Catalan Number |  |
|  | Bell Numbers (Number of ways to Partition a Set) |  |
|  | Binomial Coefficient |  |
|  | Permutation Coefficient |  |
|  | Tiling Problem |  |
|  | Gold Mine Problem |  |
|  | Coin change problem |  |
|  | Friends Pairing Problem |  |
|  | Subset Sum Problem |  |
|  | Subset Sum Problem in O(sum) space |  |
|  | Subset with sum divisible by m |  |
|  | Largest divisible pairs subset |  |
|  | Perfect Sum Problem (Print all subsets with given sum) |  |
|  | Compute nCr % p |  |
|  | Choice of area |  |
|  | Cutting a Rod |  |
|  | Tiling with Dominoes |  |
|  | Painting Fence Algorithm |  |
|  | Newman–Shanks–Williams prime |  |
|  | Assembly line scheduling |  |
|  | Golomb sequence |  |
|  | Moser-de Bruijn Sequence |  |
|  | Newman-Conway Sequence |  |
|  | Find maximum length Snake sequence |  |
|  | Print n terms of Newman-Conway Sequence |  |
|  | Print Fibonacci sequence using 2 variables |  |
|  | Print Fibonacci Series in reverse order |  |
|  | Count even length binary sequences with same sum of first and second half bits |  |
|  | Sequences of given length where every element is more than or equal to twice of previous |  |
|  | Longest Common Subsequence |  |
|  | Longest Repeated Subsequence |  |
|  | Longest Increasing Subsequence |  |
|  | A Space Optimized Solution of LCS |  |
|  | LCS (Longest Common Subsequence) of three strings |  |
|  | Maximum sum Bi-tonic Sub-sequence |  |
|  | Maximum Sum Increasing Subsequence |  |
|  | Maximum product of an increasing subsequence |  |
|  | Count all subsequences having product less than K |  |
|  | Maximum subsequence sum such that no three are consecutive |  |
|  | Longest subsequence such that difference between adjacents is one |  |
|  | Maximum length subsequence with difference between adjacent elements as either 0 or 1 |  |
|  | Maximum sum increasing subsequence from a prefix and a given element after prefix is must |  |
|  | Maximum Length Chain of Pairs |  |
|  | Print Maximum Length Chain of Pairs |  |
|  | Path with maximum average value |  |
|  | Maximum games played by winner |  |
|  | Maximum path sum in a triangle |  |
|  | Minimum Sum Path in a Triangle |  |
|  | Maximum sum of a path in a Right Number Triangle |  |
|  | Size of The Subarray With Maximum Sum |  |
|  | Maximum sum of pairs with specific difference |  |
|  | Maximum size square sub-matrix with all 1s |  |
|  | Maximum number of segments of lengths a, b and c |  |
|  | Recursively break a number in 3 parts to get maximum sum |  |
|  | Maximum value with the choice of either dividing or considering as it is |  |
|  | Maximum weight path ending at any element of last row in a matrix |  |
|  | Maximum sum in a 2 x n grid such that no two elements are adjacent |  |
|  | Maximum difference of zeros and ones in binary string | Set 2 (O(n) time) |  |
|  | Maximum path sum for each position with jumps under divisibility condition |  |
|  | Maximize the sum of selected numbers from an array to make it empty |  |
|  | Maximum subarray sum in an array created after repeated concatenation |  |
|  | Maximum path sum that starting with any cell of 0-th row and ending with any cell of (N-1)-th row |  |
|  | Min Cost Path |  |
|  | Minimum number of jumps to reach end |  |
|  | Minimum cost to fill given weight in a bag |  |
|  | Minimum sum of multiplications of n numbers |  |
|  | Minimum removals from array to make max – min <= K |  |
|  | Minimum steps to minimize n as per given condition |  |
|  | Minimum number of edits ( operations ) require to convert string 1 to string 2 |  |
|  | Minimum time to write characters using insert, delete and copy operation |  |
|  | Longest Common Substring |  |
|  | Longest Common Substring (Space optimized DP solution) |  |
|  | Sum of all substrings of a string representing a number | Set 1 |  |
|  | Find number of endless points |  |
|  | Find n-th element from Stern’s Diatomic Series |  |
|  | Find maximum possible stolen value from houses |  |
|  | Find number of solutions of a linear equation of n variables |  |
|  | Count number of ways to reach a given score in a game |  |
|  | Count ways to reach the nth stair using step 1, 2 or 3 |  |
|  | Count of different ways to express N as the sum of 1, 3 and 4 |  |
|  | Count ways to build street under given constraints |  |
|  | Count Balanced Binary Trees of Height h |  |
|  | Counting pairs when a person can form pair with at most one |  |
|  | Counts paths from a point to reach Origin |  |
|  | Count number of ways to cover a distance |  |
|  | Count of arrays having consecutive element with different values |  |
|  | Count ways to divide circle using N non-intersecting chords |  |
|  | Count the number of ways to tile the floor of size n x m using 1 x m size tiles |  |
|  | Count all possible paths from top left to bottom right of a mXn matrix |  |
|  | Count number of ways to fill a “n x 4” grid using “1 x 4” tiles |  |
|  | Largest Sum Contiguous Subarray |  |
|  | Smallest sum contiguous subarray |  |
|  | Size of array after repeated deletion of LIS |  |
|  | Remove array end element to maximize the sum of product |  |
|  | Convert to Strictly increasing array with minimum changes |  |
|  | Longest alternating (positive and negative) subarray starting at every index |  |
|  | Ways to sum to N using array elements with repetition allowed |  |
|  | Unique paths in a Grid with Obstacles |  |
|  | Number of n-digits non-decreasing integers |  |
|  | Number of ways to arrange N items under given constraints |  |
|  | Probability of reaching a point with 2 or 3 steps at a time |  |
|  | Value of continuous floor function : F(x) = F(floor(x/2)) + x |  |
|  | Number of decimal numbers of length k, that are strict monotone |  |
|  | Different ways to sum n using numbers greater than or equal to m |  |
|  | Lobb Number |  |
|  | Eulerian Number |  |
|  | Delannoy Number |  |
|  | Entringer Number |  |
|  | Rencontres Number |  |
|  | Jacobsthal and Jacobsthal-Lucas numbers |  |
|  | Super Ugly Number (Number whose prime factors are in given set) |  |
|  | Floyd Warshall Algorithm |  |
|  | Bellman–Ford Algorithm |  |
|  | 0-1 Knapsack Problem |  |
|  | Printing Items in 0/1 Knapsack |  |
|  | Unbounded Knapsack (Repetition of items allowed) |  |
|  | Temple Offerings |  |
|  | Egg Dropping Puzzle |  |
|  | Dice Throw Problem |  |
|  | Word Break Problem |  |
|  | Vertex Cover Problem |  |
|  | Tile Stacking Problem |  |
|  | Box-Stacking Problem |  |
|  | Highway Billboard Problem |  |
|  | Largest Independent Set Problem |  |
|  | Partition Problem |  |
|  | Print equal sum sets of array (Partition problem) | Set 1 |  |
|  | Print equal sum sets of array (Partition Problem) | Set 2 |  |
|  | High-effort vs. Low-effort Tasks Problem |  |
|  | Travelling Salesman Problem | Set 1 (Naive and Dynamic Programming) |  |
|  | Longest Bitonic Subsequence |  |
|  | Printing Longest Bitonic Subsequence |  |
|  | Longest Palindromic Subsequence |  |
|  | Print Longest Palindromic Subsequence |  |
|  | Longest palindrome subsequence with O(n) space |  |
|  | Count All Palindromic Subsequence in a given String |  |
|  | Longest Palindromic Substring | Set 1 |  |
|  | Count All Palindrome Sub-Strings in a String | Set 1 |  |
|  | Number of palindromic subsequences of length k |  |
|  | Count of Palindromic substrings in an Index range |  |
|  | Shortest Common Supersequence |  |
|  | Maximum sum alternating subsequence |  |
|  | Longest alternating subsequence |  |
|  | Shortest Uncommon Subsequence |  |
|  | Longest Repeating Subsequence |  |
|  | Count Distinct Subsequences |  |
|  | Count distinct occurrences as a subsequence |  |
|  | Longest Common Increasing Subsequence (LCS + LIS) |  |
|  | Variations of LIS |  |
|  | LCS formed by consecutive segments of at least length K |  |
|  | Printing Maximum Sum Increasing Subsequence |  |
|  | Longest Increasing Odd Even Subsequence |  |
|  | Count number of increasing subsequences of size k |  |
|  | Printing longest Increasing consecutive subsequence |  |
|  | Construction of Longest Increasing Subsequence using Dynamic Programming |  |
|  | Longest Zig-Zag Subsequence |  |
|  | Largest sum Zigzag sequence in a matrix |  |
|  | Find all distinct subset (or subsequence) sums of an array |  |
|  | Print all longest common sub-sequences in lexicographical order |  |
|  | Printing Longest Common Subsequence | Set 2 (Printing All) |  |
|  | Length of Longest Balanced Subsequence |  |
|  | Non-decreasing subsequence of size k with minimum sum |  |
|  | Longest Common Subsequence with at most k changes allowed |  |
|  | Weighted job scheduling |  |
|  | Weighted Job Scheduling | Set 2 (Using LIS) |  |
|  | Weighted Job Scheduling in O(n Log n) time |  |
|  | Number of paths with exactly k coins |  |
|  | Minimum number of coins that make a given value |  |
|  | Collect maximum coins before hitting a dead end |  |
|  | Coin game winner where every player has three choices |  |
|  | Probability of getting at least K heads in N tosses of Coins |  |
|  | Count all increasing subsequences |  |
|  | Count number of paths with at-most k turns |  |
|  | Count possible ways to construct buildings |  |
|  | Count number of ways to jump to reach end |  |
|  | Count number of ways to reach destination in a Maze |  |
|  | Count all triplets whose sum is equal to a perfect cube |  |
|  | Count number of binary strings without consecutive 1’s |  |
|  | Count number of subsets having a particular XOR value |  |
|  | Count Possible Decodings of a given Digit Sequence |  |
|  | Count number of ways to partition a set into k subsets |  |
|  | Count of n digit numbers whose sum of digits equals to given sum |  |
|  | Count ways to assign unique cap to every person |  |
|  | Count binary strings with k times appearing adjacent two set bits |  |
|  | Count of strings that can be formed using a, b and c under given constraints |  |
|  | Count digit groupings of a number with given constraints |  |
|  | Count all possible walks from a source to a destination with exactly k edges |  |
|  | Count Derangements (Permutation such that no element appears in its original position) |  |
|  | Count total number of N digit numbers such that the difference between sum of even and odd digits is 1 |  |
|  | Maximum Product Cutting |  |
|  | Maximum profit from sale of wines |  |
|  | Maximum size subset with given sum |  |
|  | Maximum difference of zeros and ones in binary string |  |
|  | Maximum and Minimum Values of an Algebraic Expression |  |
|  | Maximum average sum partition of an array |  |
|  | Maximize array elements upto given number |  |
|  | Maximum subarray sum in O(n) using prefix sum |  |
|  | Maximum sum subarray removing at most one element |  |
|  | K maximum sums of non-overlapping contiguous sub-arrays |  |
|  | Maximum Product Subarray | Added negative product case |  |
|  | Find maximum sum array of length less than or equal to m |  |
|  | Find Maximum dot product of two arrays with insertion of 0’s |  |
|  | Choose maximum weight with given weight and value ratio |  |
|  | Maximum sum subsequence with at-least k distant elements |  |
|  | Maximum profit by buying and selling a share at most twice |  |
|  | Maximum sum path in a matrix from top to bottom |  |
|  | Maximum decimal value path in a binary matrix |  |
|  | Finding the maximum square sub-matrix with all equal elements |  |
|  | Maximum points collected by two persons allowed to meet once |  |
|  | Maximum number of trailing zeros in the product of the subsets of size k |  |
|  | Minimum Sum Path In 3-D Array |  |
|  | Minimum insertions to sort an array |  |
|  | Minimum sum submatrix in a given 2D array |  |
|  | Minimum Initial Points to Reach Destination |  |
|  | Minimum Cost To Make Two Strings Identical |  |
|  | Paper Cut into Minimum Number of Squares | Set 2 |  |
|  | Minimum and Maximum values of an expression with \* and + |  |
|  | Minimum insertions to form a palindrome |  |
|  | Minimum number of deletions to make a string palindrome |  |
|  | Minimum number of deletions to make a string palindrome | Set 2 |  |
|  | Minimum jumps to reach last building in a matrix |  |
|  | Sub-tree with minimum color difference in a 2-coloured tree |  |
|  | Minimum number of deletions to make a sorted sequence |  |
|  | Minimum number of squares whose sum equals to given number n |  |
|  | Remove minimum elements from either side such that 2\*min becomes more than max |  |
|  | Minimal moves to form a string by adding characters or appending string itself |  |
|  | Minimum steps to delete a string after repeated deletion of palindrome substrings |  |
|  | Clustering/Partitioning an array such that sum of square differences is minimum |  |
|  | Minimum sum subsequence such that at least one of every four consecutive elements is picked |  |
|  | Minimum cost to make Longest Common Subsequence of length k |  |
|  | Minimum cost to make two strings identical by deleting the digits |  |
|  | Minimum time to finish tasks without skipping two consecutive |  |
|  | Minimum cells required to reach destination with jumps equal to cell values |  |
|  | Minimum number of deletions and insertions to transform one string into another |  |
|  | Find minimum adjustment cost of an array |  |
|  | Find if string is K-Palindrome or not | Set 1 |  |
|  | Find if string is K-Palindrome or not | Set 2 |  |
|  | Find Jobs involved in Weighted Job Scheduling |  |
|  | Find the Longest Increasing Subsequence in Circular manner |  |
|  | Find the longest path in a matrix with given constraints |  |
|  | Find the minimum cost to reach destination using a train |  |
|  | Find minimum sum such that one of every three consecutive elements is taken |  |
|  | Find number of times a string occurs as a subsequence in given string |  |
|  | Find length of the longest consecutive path from a given starting character |  |
|  | Find length of longest subsequence of one string which is substring of another string |  |
|  | Find longest bitonic sequence such that increasing and decreasing parts are from two different arrays |  |
|  | Wildcard Pattern Matching |  |
|  | WildCard pattern matching having three symbols ( \* , + , ? ) |  |
|  | Dynamic Programming | Wildcard Pattern Matching | Linear Time and Constant Space |  |
|  | Check if any valid sequence is divisible by M |  |
|  | Check for possible path in 2D matrix |  |
|  | Check if possible to cross the matrix with given power |  |
|  | Check if it is possible to transform one string to another |  |
|  | Given a large number, check if a subsequence of digits is divisible by 8 |  |
|  | Hosoya’s Triangle |  |
|  | Optimal Strategy for a game |  |
|  | Optimal Binary Search Tree |  |
|  | Number of permutation with K inversions |  |
|  | Largest divisible pairs subset |  |
|  | Sum of average of all subsets |  |
|  | Compute sum of digits in all numbers from 1 to n |  |
|  | Total number of non-decreasing numbers with n digits |  |
|  | Non-crossing lines to connect points in a circle |  |
|  | Dynamic Programming | Building Bridges |  |
|  | Longest Increasing Path in Matrix |  |
|  | Prefix Sum of Matrix (Or 2D Array) |  |
|  | Multistage Graph (Shortest Path) |  |
|  | Number of n digit stepping numbers |  |
|  | Number of substrings divisible by 8 but not by 3 |  |
|  | Number of ordered pairs such that (Ai & Aj) = 0 |  |
|  | Number of ways to form a heap with n distinct integers |  |
|  | Ways to write n as sum of two or more positive integers |  |
|  | Modify array to maximize sum of adjacent differences |  |
|  | Sum of products of all combination taken (1 to n) at a time |  |
|  | Maximize the binary matrix by filpping submatrix once |  |
|  | Length of the longest substring without repeating characters |  |
|  | Longest Even Length Substring such that Sum of First and Second Half is same |  |
|  | Shortest path with exactly k edges in a directed and weighted graph |  |
|  | Ways to arrange Balls such that adjacent balls are of different types |  |
|  | Ways of transforming one string to other by removing 0 or more characters |  |
|  | Balanced expressions such that given positions have opening brackets |  |
|  | Longest alternating sub-array starting from every index in a Binary Array |  |
|  | Partition a set into two subsets such that the difference of subset sums is minimum |  |
|  | Pyramid form (increasing then decreasing) consecutive array using reduce operations |  |
|  | Palindrome Partitioning |  |
|  | Word Wrap Problem |  |
|  | Mobile Numeric Keypad Problem |  |
|  | The painter’s partition problem |  |
|  | Boolean Parenthesization Problem |  |
|  | Program for Bridge and Torch problem |  |
|  | A Space Optimized DP solution for 0-1 Knapsack Problem |  |
|  | Matrix Chain Multiplication |  |
|  | Printing brackets in Matrix Chain Multiplication Problem |  |
|  | Number of palindromic paths in a matrix |  |
|  | Largest rectangular sub-matrix whose sum is 0 |  |
|  | Largest rectangular sub-matrix having sum divisible by k |  |
|  | Largest area rectangular sub-matrix with equal number of 1’s and 0’s |  |
|  | Maximum sum bitonic subarray |  |
|  | Maximum sum rectangle in a 2D matrix |  |
|  | Maximum Subarray Sum Excluding Certain Elements |  |
|  | Maximum weight transformation of a given string |  |
|  | Collect maximum points in a grid using two traversals |  |
|  | K maximum sums of overlapping contiguous sub-arrays |  |
|  | How to print maximum number of A’s using given four keys |  |
|  | Maximize arr[j] – arr[i] + arr[l] – arr[k], such that i < j < k < l |  |
|  | Maximum profit by buying and selling a share at most k times |  |
|  | Maximum points from top left of matrix to bottom right and return back |  |
|  | Check whether row or column swaps produce maximum size binary sub-matrix with all 1s |  |
|  | Minimum Cost Polygon Triangulation |  |
|  | Minimum cost to sort strings using reversal operations of different costs |  |
|  | Find minimum possible size of array with given rules for removing elements |  |
|  | Minimum number of elements which are not part of Increasing or decreasing subsequence in array |  |
|  | Count ways to increase LCS length of two strings by one |  |
|  | Count of AP (Arithmetic Progression) Subsequences in an array |  |
|  | Count of arrays in which all adjacent elements are such that one of them divide the another |  |
|  | Number of NGEs to the right |  |
|  | Longest Arithmetic Progression |  |
|  | Longest Geometric Progression |  |
|  | Dynamic Programming on Trees | Set-1 |  |
|  | Dynamic Programming on Trees | Set-2 |  |
|  | All ways to add parenthesis for evaluation |  |
|  | Shortest possible combination of two strings |  |
|  | Check if all people can vote on two machines |  |
|  | Find if a string is interleaved of two other strings |  |
|  | Longest repeating and non-overlapping substring |  |
|  | Probability of Knight to remain in the chessboard |  |
|  | Number of subsequences of the form a^i b^j c^k |  |
|  | Number of subsequences in a string divisible by n |  |
|  | Printing Shortest Common Supersequence |  |
|  | Smallest length string with repeated replacement of two distinct adjacent |  |
|  | Number of ways to insert a character to increase the LCS by one |  |
|  | Traversal of tree with k jumps allowed between nodes of same height |  |
|  | Find all combinations of k-bit numbers with n bits set where 1 <= n <= k in sorted order |  |