Complete Placement Preparations

- Basic Fundamentals of Language (C/C++/Java)
    - Hello World Program (Main class)
    - Variables
    - Data Types
    - Input Output Format
    - Operators
        - Unary Operator (Prefix, Postfix)
        - Arithmetic Operator
        - Shift Operator
        - Relational Operator
        - Bitwise Operator
        - Logical Operator
        - Ternary Operator
        - Assignment Operator
    - Precedence, Order of Evaluation, and Associativity
    - Control Statements
        - If-else
        - Switch
        - For Loop
        - While Loop
        - Do While Loop
        - Break
        - Continue
    - Functions
    - Struct / Class
- Flow Chart
- Pseudo Code / Algorithms
- Problem Solving / Steps of Solving Problems
    - Define Problem
    - Analyse Problem
    - Generate all possible solutions
    - Analyse solutions
    - Select the best optimal solution
    - Implement Solution
- Algorithm Complexity
    - Time Complexity
    - Space Complexity

Assignment 1

1. WAP to take input 2 numbers from the user and print the sum of the numbers.
2. WAP to take input 1 number from the user and print its square and cube.
3. WAP to calculate and print area of circle and circumference of circle.
4. WAP to take input rupees from the user and convert it into paise.
5. WAP to take input days from the user and convert it into years, months, and remaining days.
6. WAP to take input 3 digit numbers from the user and print sum of 1 and 3 digit.
7. WAP to take input 3 digit numbers from the user and print the square of the middle digit.
8. WAP to take input 4 digit numbers from the user and print its all digits.
9. WAP to check whether a number is even or odd.
10. WAP to check whether the number is positive, negative or zero.
11. WAP to take input two numbers from the user and print the largest of them.
12. WAP to take input 2 numbers from the user and print their difference.
13. WAP to take input 3 numbers from the user and print the largest number among them.
    1. using nested if
    2. using AND operator
14. WAP to take input rate & quantity and calculate the amount. Finally print net amount to be paid after allowing 15% discount if amount exceeds 2000 rs.
15. WAP to take input 3 numbers and print the 2nd largest number among them.
16. WAP to take input a number (range 1 to 7) from the user and print the corresponding week.
    1. using if else
    2. using switch
17. WAP to input year from user and check whether it is a leap year or not.
18. WAP to take input 3 numbers from the user and print the numbers in the descending order.
19. WAP to take input income from the user and calculate the amount of tax to be paid as per rules.
    1. Less or equal to 10,000 -> no tax
    2. Greater than 10,000 and less or equal to 25,000 -> 10% of income above 10,000
    3. Greater than 25,000 and less or equal to 50,000 -> 2500 + 20% income above 25,000
    4. Greater than 50,000 -> 5000 + 30% of income above 50,000
20. WAP to perform arithmetic operations as per user's choice.
21. WAP to calculate the area of rectangle, circle and triangle as per user's choice.
22. WAP to input a character from user and check whether it is an alphabets, digits, or special symbols.
23. WAP to input a character from user and check whether it is uppercase and lowercase.
24. WAP to check whether a character given by user is a vowel or consonant.
25. WAP to convert a character into its toggle case.
26. WAP to input a lower limit and an upper limit from user and print all the numbers in between the given limits.

27. WAP to input a lower limit and an upper limit from user and print all the even numbers in between the given limits.
28. WAP to input a number from user and print its factorial.
29. WAP to input a number from user and print its table.
30. WAP to print the sum of the divisors of a number given by user.
31. WAP to check whether a number is perfect or not.
32. WAP to print the reverse of a number given by user.
33. WAP to take input a number from the user and check whether it is palindrome.
34. WAP to take input a number from the user and check whether it is armstrong.
35. WAP to take input a number from user and print in the form of series:
    1. 1, 3, 6, 10, 15, ... nth term
    2. 1, 11, 111, 1111, ... nth term
    3. 1, 12, 123, 1234, … nth term
    4. 0, 7, 26, 63, … nth term
    5. 0, 1, 1, 2, 3, 5, 8, … nth term
    6. 0, 1, 3, 7, 15, … nth term
    7. x - x ^ 2 + x ^ 3 - x ^ 4 + x ^ 5 … nth term (do sum here also)
36. WAP to calculate the average of even and odd numbers given by user until user press -1.
37. Define a class called MovieMagic with the following description :-
    1. Instance variables :-
        1. int year - to store the year of release of movie.
        2. String title - to store the title of the movie.
        3. float rating - to store the popularity rating of the movie.
    2. Member methods :-
        1. MovieMagic() - default constructor to initialise data members.
        2. void accept() - to input and store year, title and rating.
        3. void display() - to display the title of a movie and a message based on the rating as per the table.
            1. 0.0 to 2.0 - Flop
            2. 2.1 to 3.4 - Semi-hit
            3. 3.5 to 4.5 - Hit
            4. 4.6 to 5.0 - Super Hit
    3. Write a main() method to create an object of the class and call the above member methods.
38. Define a class called ParkingLot with the following description :-
    1. Instance variables :-
        1. int vehicleNumber - to store vehicle number.
        2. double hours - to storee the number of hours the vehicle is parked.
        3. double bill - to store the bill amount.
    2. Member methods :-
        1. ParkingLot - to initialise data members.
        2. void input() - to input and store the vehicleNumber and hours.

    3. void calculate() - to compute the parking charge at rate of 3 rs for the first hour or part thereof and 1.5 rs for each additional hour.
    4. void display() - to display details.
3. Write a main() method to create an object of the class and call the above methods.

39. WAP to input a string from the user and count the number of alphabets, digits & special symbols in the string.
40. WAP to convert a string into PIGLATIN form.

Arrays & Strings

- Creation
- Insertion
- Traversing
- Searching
    - Linear Search
    - Binary Search
    - Ternary Search
- Deletion
- Sorting
    - Selection Sort
    - Bubble Sort
    - Insertion sort
    - Merge Sort
    - Quick Sort
    - Counting Sort
- 2-D Arrays

Assignment 2

1. WAP to input an array from the user and print all its values.
2. WAP to input an array from the user and print the sum of all its values.
3. WAP to input an array from the user and print its reverse.
4. WAP to print the sum of even and odd values of an array given by the user.
5. WAP to print the average of even and odd values of an array separately.

Notes: All theory concepts will also be implemented as assignments.

- C++ STL
    - vector
    - list
    - set
    - map
- Java Collections
    - ArrayList
    - LinkedList
    - Set
    - Map
- References
    - https://www.youtube.com/watch?v=-uG0_xJ6Ovk
    - https://www.youtube.com/watch?v=LRJ5uAkRtiQ

Assignment 3

1. Concatenation of Array
2. Build Array from Permutation
3. Shuffle the Array
4. Kids With the Greatest Number of Candies
5. Create Target Array in the Given Order
6. Decompress Run-Length Encoded List
7. Check If Two String Arrays are Equivalent
8. Shuffle String
9. Number of Senior Citizens
10. Largest Local Values in a Matrix
11. Cells with Odd Values in a Matrix
12. Find Numbers with Even Number of Digits
13. Minimum Operations to Make the Array Increasing

Assignment 4 (2D Array)

1. Richest Customer Wealth
2. Count Negative Numbers in a Sorted Matrix
3. Matrix Diagonal Sum
4. Convert 1D Array Into 2D Array
5. Reshape the Matrix
6. Transpose Matrix
7. Spiral Matrix
8. Spiral Matrix II
9. Rotate Image
10. Set Matrix Zeroes
11. Valid Sudoku

Assignment 5 (Prefix & Suffix Sum)

1. Running Sum of 1d Array
2. Find the Highest Altitude
3. Minimum Value to Get Positive Step by Step Sum
4. **Range Sum Query - Immutable**
5. Maximum Score After Splitting a String
6. Find Pivot Index
7. **Matrix Block Sum**
8. **Sum of Absolute Differences in a Sorted Array**
9. **Product of Array Except for Self**
10. Shifting Letters

Assignment 6 (Binary Search)

1. Binary Search
2. Search Insert Position
3. Count Negative Numbers in a Sorted Matrix
4. Special Array With X Elements Greater Than or Equal X
5. Kth Missing Positive Number

6. The K Weakest Rows in a Matrix
7. Arranging Coins
8. First Bad Version
9. **Valid Perfect Square**

   (https://leetcode.com/problems/valid-perfect-square/solutions/622870/java-binary-search-clean-code-log-n-solution)
10. **Sqrt(x)**
11. **Magnetic Force Between Two Balls**

    (https://leetcode.com/problems/magnetic-force-between-two-balls/solutions/1251695/java-clean-concise-optimal-code-binary-search-algorithm-90-faster-solution**)**
12. **Capacity To Ship Packages Within D Days**

    (https://leetcode.com/problems/capacity-to-ship-packages-within-d-days/solutions/1184397/java-clean-optimal-code-binary-search-technique-o-n-log-weightssum-time-100-beats)
13. Peak Index in a Mountain Array
14. **Find the Smallest Divisor Given a Threshold**
15. **Minimum Limit of Balls in a Bag**

    (https://leetcode.com/problems/minimum-limit-of-balls-in-a-bag/solutions/1184716/java-clean-concise-code-binary-search-technique-o-n-log-10-9-time-100-optimal-code)
16. Single Element in a Sorted Array
17. **Most Profit Assigning Work**
18. **Search a 2D Matrix**
19. Search a 2D Matrix II
20. Valid Triangle Number
21. Find Minimum in Rotated Sorted Array
22. Random Pick with Weight
23. Find Peak Element
24. **Find First and Last Position of Element in Sorted Array**

    (https://leetcode.com/problems/find-first-and-last-position-of-element-in-sorted-array/solutions/1180751/java-clean-concise-code-binary-search-algorithm-100-optimal-solution)
25. **Search in Rotated Sorted Array**

    (https://leetcode.com/problems/search-in-rotated-sorted-array/solutions/5929252/java-clean-concise-optimal-code-binary-search-algorithm-100-beats)
26. **Minimum Number of Days to Make m Bouquets**
27. H-Index II

28. Sum of Square Numbers
29. Maximum Candies Allocated to K Children
30. **Koko Eating Bananas**
31. **Minimum Time to Repair Cars**
32. **Plates Between Candles**
33. **Minimize the Maximum Difference of Pairs**
34. **Maximum Running Time of N Computers**
35. Find Minimum in Rotated Sorted Array II

Assignment 7 (Sliding Window)

1. Alternating Groups I
2. **Count Number of Nice Subarrays**
3. Number of Sub-arrays of Size K and Average Greater than or Equal to Threshold
4. **Number of Substrings Containing All Three Characters**
5. **Minimum Swaps to Group All 1's Together II**
6. **Grumpy Bookstore Owner**
7. Max Consecutive Ones III
8. Maximum Number of Vowels in a Substring of Given Length
9. Maximum Erasure Value
10. **Get Equal Substrings Within Budget**
11. **Maximum Points You Can Obtain from Cards**
12. Subarray Product Less Than K
13. **Find All Anagrams in a String**
14. **Minimum Size Subarray Sum**
15. Permutation in String
16. Alternating Groups II
17. **Minimum Operations to Reduce X to Zero**
18. **Longest Substring Without Repeating Characters**

19. **Sliding Window Maximum**
20. **Minimum Window Substring**

Assignment 8 (Two Pointer)

1. Reverse String
2. Reverse Prefix of Word
3. Reverse Words in a String III
4. Remove Palindromic Subsequence
5. DI String Match
6. Reverse Only Letters
7. Count Binary Substrings
8. **Move Zeroes**
9. Remove Element
10. **Remove Duplicates from Sort**
11. Reverse Vowels of a String
12. Reverse String II
13. Valid Palindrome
14. Append Characters to String
15. **Interval List Intersections**
16. Two Sum II - Input Array Is Sorted
17. Remove Duplicates from Sorted Array II
18. **Container With Most Water**
19. String Compression
20. Form Array by Concatenating Subarrays of Another Array
21. Number of Subarrays with Bounded Maximum
22. Reverse Words in a String
23. **Rotate Array**
24. Compare Version Numbers

25. **Next Permutation**
26. Sentence Similarity III
27. **Trapping Rain Water**

Assignment 9 (Sorting)

1. Sort an Array
2. Minimum Number of Moves to Seat Everyone
3. Widest Vertical Area Between Two Points Containing No Points
4. Sorting the Sentence
5. Height Checker
6. Array Partition
7. Sort Array By Parity
8. **Maximum Units on a Truck**
9. Squares of a Sorted Array
10. Minimum Subsequence in Non-Increasing Order
11. Minimum Absolute Difference
12. Can Make Arithmetic Progression From Sequence
13. **Merge Sorted Array**
14. Maximum Product of Three Numbers
15. Third Maximum Number
16. Maximum Number of Coins You Can Get
17. Minimize Maximum Pair Sum in Array
18. Maximum Ice Cream Bars
19. Pancake Sorting
20. Check If a String Can Break Another String
21. **Two City Scheduling**
22. Maximum Element After Decreasing and Rearranging
23. Rearrange Words in a Sentence
24. **Sort Colors**
25. Maximum Number of Consecutive Values You Can Make

26. Minimum Moves to Equal Array Elements II
27. **Minimum Increment to Make Array Unique**
28. **Boats to Save People**
29. Minimum Number of Arrows to Burst Balloons
30. **Bag of Tokens**
31. Remove Covered Intervals
32. Max Number of K-Sum Pairs
33. Longest Word in Dictionary through Deleting
34. **Merge Intervals**
35. **3Sum Closest**
36. **Maximum Area of a Piece of Cake After Horizontal and Vertical Cuts**
37. **H-Index**
38. **Maximum Sum Obtained of Any Permutation**
39. **3Sum**
40. **4Sum**
41. Largest Number
42. **Smallest Range II**
43. Orderly Queue