Interview questions:

Notes-

a) This is an open book test and duration of this test is 48 hours.
b) You can use the internet to search for answers and build the code.
c) Please be honest and tell us what you searched and what you remembered.
d) Do not copy paste the code you found off the internet, try to build it and explain in the space given.
e) Do not work in groups. It is an individual activity.
f) If you create a Github profile with the answers to questions – its an added bonus.
g) You can write your code/comments in the word document, convert to PDF and send it across to us.
h) We take cheating very seriously and could have negative repercussions if found out later.
i) Do not use LLM as it is (Ok for learning concepts) and show screenshots of testing results after running through a online compilation tool. .

I declare that I have done the above work by myself and not worked with anyone or got help from any individual on the internet.

a) String compression

Implement a method to perform string compression. E.g. 'aabccccccaaa' should be a2b1c5a3. The code to implement this is given in the link - https://www.educative.io/answers/string-compression-using-run-length-encoding

Build a second compressor which takes the output of first compressor and optimizes further. The answer should be taken into second compressor and compress further.
E.g. a2b2c1a3c3 should become ab2c1ac3. Please test at the end cases as well. The code should work with inputs like a20b20c1a4 – ab20c1a4. Test and show the result of the same.
The compressed output should be put into a decompressor -
ab2c1ac3 should return aabbcaaaccc.
Write all the test cases to evaluate this and see if the results match.

b) Linked List - How to find the middle element of a singly linked list in one pass?

c) Given an array of integers representing the elevation of a roof structure at various positions, each position is separated by a unit length, Write a program to determine the amount of water that will be trapped on the roof after heavy rainfall

Example:
input : [2 1 3 0 1 2 3]
Ans : 7 units of water will be trapped

https://www.geeksforgeeks.org/trapping-rain-water/

Go through the above code for the solution.

The next phase is that the values are now not discrete but analog. E.g. I give an equation of function that is bounded, can you predict how many units of water gets trapped.

d) Count Ways to Express a Number as the Sum of Consecutive Natural Numbers
Given a natural number n, we are asked to find the total number of ways to express n as the sum of consecutive natural numbers.

Example 1:Input: 15
Output: 3
Explanation: There are 3 ways to represent 15 as sum of consecutive natural numbers as follows:
1 + 2 + 3 + 4 + 5 = 15
4 + 5 + 6 = 15
7 + 8 = 15

e) Write a piece of code to find the largest 5 digit prime number in the first 100 digits of Pi?

f) Write a piece of code to determine if two rectangles are intersecting each other or not? Think about the logic and explain the same before showing the code.

g) Explain a piece of code that you wrote which you are proud of? If you have not written any code, please write your favorite subject in engineering studies. We can go deep into that subject.

h) Write a Program to multiple two (n*n) Matrices? Explain logic on how you would do it.

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