



IT & QUANT

Quant

General Preparation -

- 2018 - 2019 Inter IIT Placement Questions -
https://docs.google.com/document/d/e/2PACX-1vRqsXE-lzz-qktbRKVexkt_eByPQQzaJ5vRKnd7gMCISINVRDF6tHJwXiVoz0NnJ-V9JamNaUvDEGou/pub
- 2019 - 2020 Inter IIT Placement Questions -
https://docs.google.com/document/d/1I_N0dUs-SFqJ0E3v2bEZmlqmgCJr3fGD911Nd1En10s/edit
- 2020 - 2021 Inter IIT Placement Questions -
https://docs.google.com/document/d/e/2PACX-1vSDJ7BiVSUGaO6tDhv2kDeYDJnZ_TxuhTmg9loZlg6C-jlkfUdaJYdf5XasgbTgbOdDsm9ZK-udGamv/pub#id.bw56fwlrzox

For the Probability and Logical Thinking Aspect of the tests, one can refer to the following:-

Books -

- A Practical Guide To Quantitative Finance Interviews- Xinfeng Zhou
- Quant Job Interview Questions And Answers- Mark S. Joshi, Nick Denson, Andrew Downes

Websites -

- <https://brainstellar.com/>
 - Focus on the Probability Puzzles (<https://brainstellar.com/puzzles/probability/1>) and on the Strategy Puzzles (<https://brainstellar.com/puzzles/strategy/1>).
 - Prepare for the more math-oriented questions by trying out the questions at <https://brainstellar.com/puzzles/discrete/1>
- <https://www.mathtrainer.io/>
 - Practice solving basic arithmetic questions fast with great efficiency for companies having paper patterns like 80-in-8, etc.
- <https://gurmeet.net/puzzles/>
- <http://qbyte.org/>
- <https://owncloud.iitd.ac.in/nextcloud/index.php/s/ngiMAYCjgLbrwoq>

IT

For the Coding Aspect of the tests, one can refer to the following -

Books -

- Cracking the Coding Interview by Gayle Laakmann McDowell

DSA Sheets –

Striver SDE Sheet -

- <https://takeuforward.org/interviews/strivers-sde-sheet-top-coding-interview-problems/>

Love Babbar SDE Sheet -

- [https://practice.geeksforgeeks.org/explore?page=1&curated\[\]=7&sortBy=submissions&curated_names\[\]=Love%20Babbar%20Sheet&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header](https://practice.geeksforgeeks.org/explore?page=1&curated[]=7&sortBy=submissions&curated_names[]=Love%20Babbar%20Sheet&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header)

Fraz SDE Sheet -

- https://docs.google.com/spreadsheets/d/1-wKcV99KtO91dXdPkwmXGTdtyxAfk1mbPXQg81R9sFE/htmlview?usp=sharing&pru=AAABejzrq8g*Ne3DdQllhuvMwAp-3dW3PA

Websites -

- [https://practice.geeksforgeeks.org/explore?page=1&curated\[\]=1&sortBy=submissions&curated_names\[\]=SDE%20Sheet&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header](https://practice.geeksforgeeks.org/explore?page=1&curated[]=1&sortBy=submissions&curated_names[]=SDE%20Sheet&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header)
- <https://leetcode.com/problem-list/top-interview-questions/>
- <https://leetcode.com/problem-list/top-100-liked-questions/>
- <https://practice.geeksforgeeks.org/courses/dsa-self-paced>

Company Specific Preparation

Microsoft India Pvt. Ltd. (Software Engineer) -

- <https://www.interviewbit.com/microsoft-interview-questions/>
- [https://practice.geeksforgeeks.org/explore?page=1&company\[\]=Microsoft&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header](https://practice.geeksforgeeks.org/explore?page=1&company[]=Microsoft&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header)

Google (Software Engineer) -

- <https://www.interviewbit.com/amazon-interview-questions/>

Qualcomm (Software Engineer-Mtech) -

- [https://practice.geeksforgeeks.org/explore?page=1&company\[\]=Qualcomm&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header](https://practice.geeksforgeeks.org/explore?page=1&company[]=Qualcomm&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header)

Goldman Sachs Services India Private Limited. (New Analyst) -

<https://www.interviewbit.com/goldman-sachs-interview-questions/>

Samsung Research Institute, Bangalore (Advanced Developer) -

- [https://practice.geeksforgeeks.org/explore?page=1&company\[\]=Samsung&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header](https://practice.geeksforgeeks.org/explore?page=1&company[]=Samsung&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header)

Grofers India Private Ltd. (Associate Product Manager) -

- [https://practice.geeksforgeeks.org/explore?page=1&company\[\]=Grofers&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header](https://practice.geeksforgeeks.org/explore?page=1&company[]=Grofers&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header)

Sprinklr (Product Engineer) –

• IITK

- Profile - Product Engineer & Platform Software Engineer
3 coding questions / 1:45 Hour test on Hackerearth
Codes provided by default in all the 3 questions can be completely removed. I was overwhelmed by the code for Q1 and I wrote completely new code from scratch and passed all cases.
- **Q1(150 marks)** – Given a tree with N nodes and values assigned with them, root R, n-1 edges. You had to perform Q queries, queries can be of 2 types: (i) update I k: add k to the value ith node (ii) sum i: Report sum of the subtree rooted at i.m
Constraints: $N \leq 10^5$; $k \leq 10^7$ No need to implement Segment Tree :(n^2 algo passes all cases)
- **Q2(50 marks)-** You are given a function $f(i) = f(i-1) * (A^{i^9} + (B^{i!} + 1)^{i^i} + C^{(i^{i^i})})$.
Where $A = a^m$, $B = A^{(b+c)}$, $C = 5^B + (A^{\log_{10}(b^*c)})$
Input:- n, m, a, b, c
Output:- $f(n) \% m$
Solution- In case $(n \geq m)$ it's divisible by m so return 0; In case $(n < m)$ the problem boils down to $(n^n * (n-1)^{(n-1)} * \dots * 1^1) \% m$ as A, B and C are divisible by m.

Company Specific Preparation

- **Q3(100 marks)-** You are given an array (length $\leq 10^5$) of 0's and 1's. Is it possible to split array into 3 parts such that decimal value of all 3 parts is same? If possible, return the decimal value else return -1.

Solution - Count number of 1s. If 0, return 0. If not divisible by 3, return -1. Else divide by 3 and find the value: if you iterate from the back of given array, you can figure out the number of trailing zeros in the last split, say tz. Now you know the required number of 1s in each split and the number of trailing zeros as soon as you hit the last 1 of any split while scanning from left to right. Store the splits in vectors and remove leading zeros and compare - $v1 \neq v2$ or $v2 \neq v3$ then return -1. Else you already have the vector and you can report the desired value.

• IITR

- Profile - Product Engineer & Platform Software Engineer
(4 coding question and 45 MCQ (mostly from OS) | 2 hour test)
- **Q1.** Given a matrix where 0- blank, 1-plant, 2-source. Find the shortest distance from source to any of the boundary edges. You can traverse through 0 in any of the four directions(left, right, up, down).
- **Q2.** Find the count of all the submatrices of a matrix of size $m \times n$, such that the sum of the elements of the submatrices is divisible by given number P.
- **Q3.** Given 3 fruit f1, f2 and f3. Energy per unit of these three fruits is 2, 3 and 5 respectively. Given cnt1, cnt2, cnt3 amount of these fruits and cost per unit of fruits f1, f2 and f3 is cost1, cost2 and cost3. Find the minimum cost such that the total energy gained after buying these fruits is S.
Example: count:[2, 2, 1] cost [5, 5, 20] & S = 10
Ans: 20 if you buy 2 f1 and 2 f2.
- **Q4.** There are N nodes. Each node has exactly 1 directed edge. You have to return the node from which maximum elements can be traversed.
For eg : $N=3$ and $A[]=\{3,3,1\}$
So there is a directed edge from node 1 to node 3, from node 2 to node 3, and from node 3 to node 1;
So if we start from node 2 we can traverse all the elements.
Output : Return 2
(there was some problem in synchronizing array indexes with the given code. It's better if you delete the whole code and write your own)

Company Specific Preparation

• IIT KGP

- 28 MCQs of varying marks(2 / 4/ 6), 3 coding questions (1 of 100, 2 of 50), 314 marks, 90 mins
MCQ's based on C++, OS, COA, and some based on storage (don't recall ever seeing something like that in DBMS or any other subject)
- 100 marks coding question: Given an array of size N. Q queries given L, R, X (L, R 1-indexed),
Return the maximum between indices(both inclusive) L and R which have X set bits in binary representation. Ex: A = [1, 2, 3, 4, 5] Q = 1, => [3, 5, 2] => 3, 4, 5 fall in L, R. 3 & 5 have 2 set bits, maximum of which is 5. Return 5. Segment tree/ BIT implementation.
Solution:<https://ide.geeksforgeeks.org/ZmGxP0pHsn>
- 50 marks: Given infinite number of 3, 5, 10 denomination coins, how many ways can you generate a sum of x? Sol: <https://www.geeksforgeeks.org/count-number-ways-reach-given-score-game/>
- 50 marks question: Given an array, choose two contiguous non-overlapping arrays, such that all elements are strictly increasing. Return the maximum length possible for this combination.
Ex: 7 1 2 4 6 5 3 8 9 10 => ans: 7 (Choose 1 2 4 6 & 8 9 10) |

Company Specific Preparation

• IITG

- 4 coding questions and 45 MCQ (mostly from OS, Linux and Networks | 2 hour test)
- Q1) Given an array with non-negative elements and an integer K, find maximum sum of lengths of non-overlapping (contiguous) subarrays which have K as their maximum.
- Q2) (Same as in KGP) 100 marks coding question: Given an array of size N. Q queries given L, R, X (L, R 1-indexed), Return the maximum number between indices (both inclusive) L and R which have X set bits in binary representation.
 Ex: A = [1, 2, 3, 4, 5] Q = 1, => [3, 5, 2] => 3, 4, 5 falls in L, R. 3 & 5 have 2 set bits, maximum of which is 5. Return 5.
 Segment tree/ BIT implementation.
Solution: <https://ide.geeksforgeeks.org/ZmGxP0pHsn>
- Q3) (Same as in IITR) 50 Marks: Given 3 fruit f1, f2 and f3. The energy per unit of these three fruits is 2, 3 and 5 respectively. Given cnt1, cnt2, and cnt3 amount of these fruits and cost per unit of fruits f1, f2 and f3 is cost1, cost2, and cost3. Find the minimum cost such that the total energy gained after buying these fruits is S.
 Example: count: [2, 2, 1] cost [5, 5, 20] & S = 10
 Ans: 20 if you buy 2 f1 and 2 f2.
Solution: Make an array containing cnt1 times 2, cnt2 times 3 and cnt3 times 5 as its elements. Now find the minimum cost subsequence which sums to S.
 Use cost_i instead of count in this approach:
<https://www.geeksforgeeks.org/maximum-size-subset-given-sum/>
- Q4) Given a number X, the following two operations with different costs can be performed on it at Cost A: $X \rightarrow X-1$ or $X \rightarrow X+1$ at Cost B: $X \rightarrow X/2$ Find the minimum cost to reach this number X starting from 0.
Solution: (greedy) Start from X,
 If X is 0, the answer is 0.-
 if X is even then one can reach X/2 in min(A*X/2, B) cost. answer will be min(A*X/2, B) + func(X/2).
 If X is odd then make it even using A cost. answer will be A + min(func(X+1), func(X-1))
 We are reaching to 0 in minimum **number** of operations. And at each operation the option with minimum **cost** is taken.
 This solution is giving runtime error because there is no limit for x+1, Can someone please post another sol ?
The solution above is correct, please check your implementation. X+1 will become (X+1)/2 in the next step. So convergence is guaranteed. BFS should work

Company Specific Preperation

Oracle (Member Technical Staff) -

- <https://www.interviewbit.com/oracle-interview-questions/>

Amazon (Software Development Engineer) –

- <https://www.interviewbit.com/amazon-interview-questions/>
- [https://practice.geeksforgeeks.org/explore?page=1&company\[\]=Amazon&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header](https://practice.geeksforgeeks.org/explore?page=1&company[]=Amazon&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header)
- https://www.youtube.com/watch?v=SMgm_gpJyNU

Uber India Systems Pvt. Ltd (Software Engineer I) -

<https://www.interviewbit.com/uber-interview-questions/>

Morgan Stanley (Associate - Strats and Quant Profile) -

- [https://practice.geeksforgeeks.org/explore?page=1&company\[\]=Morgan%20Stanley&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header](https://practice.geeksforgeeks.org/explore?page=1&company[]=Morgan%20Stanley&sortBy=submissions&utm_source=gfg&utm_medium=gfg_header&utm_campaign=gfgpractice_header)

• IIT BHU

- Coin change problem. <https://www.geeksforgeeks.org/coin-change-dp-7/>
- A variation of <https://www.interviewbit.com/problems/capture-regions-on-board/>

• IITG

- 7 Syntax/Logical error correction coding questions in 20 minutes
+
- 10 aptitude questions in 20 minutes
+
- 3 coding questions in 40 minutes
 - First two questions were similar to <https://leetcode.com/problems/friend-circles/>.
 - Given a binary 2D matrix, you had to convert 0s to 1s, maximizing the conversions when you can convert a group at once. You are supposed to leave a minimum of k groups. Return the number of 0s converted.
 - You just needed to copy and paste the code from the first and change 2 lines :P
 - A simple problem, could be solved using Marshall's algorithm or simple dfs, finding the node with the longest dfs in a directed graph.
 - The constraints were pretty small, the brute force solution worked like a charm!

• IIT KGP

- Platform : Amcat
- 20 minutes - 10 aptitude (timetaking)
- 20 minutes - Syntax correction - 7 questions (easy)
- 60 mins - 3 coding questions

Company Specific Preparation

- Given two circles with their centres co-ordinates and their radii , we need to find the non overlapping area between the circles. But the catch here was people didn't know the function for cos inverse, sine inverse
- CPP Refer : inverse trigonometric functions in cpp ...its asin(), I guess
- Given a 2D matrix of 1s(bright areas) and 0s(dark area, and s) N = Number of dark areas to be removed is given.

Now, we had to find the least zeros left after converting the least N dark connected areas in the matrix.

Ans : Connected Components of the graphs concept

- Find the minimum of product all the paths from the tree to leaves. (question was not this)

Ans:If we construct the tree, it takes time. So, just maintain an array of parents and perform this multiplication

Adobe -

- <https://www.interviewbit.com/adobe-interview-questions/>

Flipkart -

- <https://www.interviewbit.com/flipkart-interview-questions/>

Oracle –

- <https://www.interviewbit.com/oracle-interview-questions/>

2 Month Road Map

One should start with building a strong base for the topics of probability and stochastic processes to crack the company tests.

One can start with reviewing the MTL106 course contents(the appropriate notes have been added in the sharepoint folder).

Focus on the various types of distributions and getting a clarity of commonly asked topics involving random variables, random vectors, and common distribution functions also.

Start solving problems on Brainstellar, etc., which has an exhaustive set of problems and probability puzzles that are commonly asked in Quant Interviews. The same can also be reviewed from books and notes like “A Practical Guide To Quantitative Finance Interviews- Xinfeng Zhou”, etc. (The same have been added in the sharepoint folder)

For the coding part of the pre-processes, one should initially focus on strengthening their core concepts and data structures, to get a better grip on solving problems using the appropriate and efficient data structures and the relevant algorithms.

If one wants to start from scratch, one could follow the DSA courses on Geeksforgeeks, Coding Ninjas, etc. One could refer to the COL106 Notes and books(added in the sharepoint folder) to understand the theoretical aspect of the data structures and get an essence of their application.

In the two months, one should try to give contests on platforms like LeetCode, CodeChef and CodeForces, to get familiarized with giving timed coding tests and understand the proper usage of manual test cases, and the various libraries.

Giving contests on these platforms could provide you with an edge over others due to the quality and originality of problems. Also, the ratings on these platforms are considered by a lot of companies to judge the candidature, and shortlist candidates.

For the System/Software role in Quant companies, one should also focus on the core Computer Science Concepts like DBMS, OS, etc. which can be learnt using the books provided in the respective COL Courses, or from online courses on Geeksforgeeks, or from youtube channels like Gatesmashers, etc.

1 Month Road Map

Due to the time constraints, one must focus on clearing their theoretical concepts using the MTL106 Notes and other books. One should also focus on platforms like Brainstellar to get a hold of common interview questions and understand how to approach problems and how to structure your process to solve the problems.

For the coding part of the pre-processes, one must focus on company specific problems on platforms like interviewbit and leetcode. One should try to solve the 100 most frequently asked problems on LeetCode, to familiarize yourself with using multiple data structures to solve problems.f

1 Week RoadMap

Search for the format of the test of the company, and talk to people who have cleared those interviews (Find the alumni using the OCS Alumni Search). Try finding the questions that have been asked usually by the company, and the topics that the company tends to ask about.

Look into the notes and go over the Top 100 questions on LeetCode, to try and get into a flow of solving medium-hard problems.

For reference, GFG Interview Experiences -

<https://www.geeksforgeeks.org/category/interview-experiences/>