IISc Banglore MTech Research CDS

Written test

Date 10 May 2022 3:00pm

Duration 75 min (start anytime between 3 to 3.30) T

12 MCQ (each with 5 points) and 2 Programming questions (5+10 points).

4 Probability Combinatorics questions

Person forgot last digit of his phone number. Prob of getting the number in <= 4 trials is?

5 colors unlimited t shirts are there. U have basket of size 10 t shirts. Possible ways of taking t shirt? pow(5,10)

3 Linear Algebra/System of Equations questions

Trace of A and A^3 given find determinant of A?

M=A - A^T + AA^T (T is transpose). M is what symmetric/ skew symmetric / symmetric only if A is symmetric etc options given.

1 general aptitude/logic question

2 calculus + function plotting questions

dy/dx=u d2y/dx2=v then d2x/dy2==?

Plot function f(x) =sin(x)* log(|x|)

2 Data Structure, algorithms, programming MCQ.

Worst case time complexity for searching in BST? --O(n)

2 coding questions (5 points and 10 points).

Que 1)

rotate array by m position right (O(n) space allowed)

https://www.geeksforgeeks.org/array-rotation/

Que 2)

Graph is given as adjacency matrix. Standard All pair shortest path Floyd warshall algorithm. After calculating it find the largest of the calculated distances.

Result Cleared Test

Interview 27th May Friday 9am in person interview at CDS IISc lasted for 50 minutes

Prof Yogesh simmhan one mam and another sir was there.

Reached IISc at 7 am security allowed us after 8 am only.

At First, they checked degree certificate and aadhar and then allotted room 201A panel.

I waited for almost 3 hours they were taking interviews for almost 30-40 minutes.

My preferences were DREAM lab, MARS Lab, VCL Lab.

They started with the form they sent earlier that I filled out and read everything that I wrote there and asked some basic questions on it.

I mentioned I studied Programming C++, data structure and scheduling algos etc.

Prof1: asked question, find the kth largest element from an given unsorted array.

Starting with basic approach of O(n^2) complexity then by sorting O(nlogn) complexity asked basic questions all the time.

Then I said we use max heap so to build heap O(n) and k times popping up the topmost element k*(logn) so int total O(n+klogn) is optimal approach. He said compare this with the sorting approach which one is better in which cases?

Prof Yogesh asked then on scheduling algos.

Prof: Name the scheduling algos you know?

FCFS,SJF,round robin, pre-emptive SJF etc.

Prof: Which one is better?

I said everyone have their own advantage like FCFS easy to implement, SJF is optimal, RR is responsive etc.

Prof: How SJF is optimal, can we implement it?

Practically no because we don't know the BT before execution.

Prof: is there any other algo which gives better performance than SJF?

as of now I don't know if there is any better than this sir but among the algos I studied SJF is better.

Prof: Okay can you mathematically prove haw SJF is optimal, and no other algorithm can give better performance than this?

I tried explaining my intuitions that since processes with small BT burst time are executing first later processes wait for less time (gave one example too).

Prof: That's okay but can you write mathematically take BT as Ti and n processes arriving at time 0 etc and show me?

Prof: Okay find the throughput from the equations.

(Similar type of discussion happened for a while he was more emphasizing on the mathematical proof also the way he was asking questions were somewhat philosophical and you probably might not have had thought of it from this perspective when you were learning the same)

Then mam asked what system calls is, user/kernel mode, is the addition expression in your c++ program also has some underlying system call etc.

Declared results on next day 3 pm 28th may 2022

Verdict: **Not selected after interview.**