Experiences at an NBHM MSc Scholarship Interview

by Neeraj Singh Bhauryal - Friday, July 25, 2014

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Hi, this is record of my Interview held in month of Nov'13 for NBHM MSc Scholarship. After clearing the written exam held in Sept'13 I was called to appear for Interview at Punjab University. The written exam was easy and I did all problems in Analysis , and I think my score was 22/30. Since I had given many interviews before this so I had the idea how things happens in the interview,I prepared Real Analysis quite well. I also looked at some topics from my Integrated PhD 1st sem mainly Topology.
So I was called for Interview in Morning at 9 and my name was there in the list at last position.

Early in the morning I saw my two IISER's professor Prof Passi and Dr.Amit there in the panel. After that I waited for my turn and entered the room at 4.20pm.

Everyone welcomed me in the room and there were 5 on the panel.(I don't know everyone's name sitting in the panel so I'll use Sir and Mam at places)

Dr Amit- Welcome Neeraj, (he jokes) abhi tak to kafi questions pata chal gye honge ki kya-kya puch rhe hai?(Till now you must have heard many problems which we have asked from others?)
Me- No sir , I haven't talked with others too much!

Mam- So what is your area of interest?
Me-Real Analysis.

Prof Passi- Since you said Analysis let me ask an interesting problem, first write down on the board $(\sqrt{2})^2$ and tell its value?
Me- (I got surprised , couldn't figure out why is he asking such an easy question!) Sir its 2!

Prof Passi- Now what is $2^{\sqrt{2}}$?
Me-(I have seen this before but couldn't recall anything)

Prof Passi- What can you say about its nature whether it is rational or irrational, or any other detail?You'll be able do it only if you've seen it before!

Me- Yes sir I've seen it(gave it a thought but was not getting anything)

Prof Passi-(After sometime) okay leave it let's move on.

Mam- What do you mean by uniform continuous function?
Me- (Gave the definition)

Mam- Is $f(x)= \frac{|x|}{1+|x|}$ uniform continuous on $\mathbb{R}$?
Me-(Did it by considering $|f(x)-f(y)|$)

Mam- Do you know any other shorter way?
Me-(Thinking for some other method)

Mam-(after a while) what about $lim_{x\to \infty}f(x)$ and $lim_{x \to -\infty} f(x)$
Me-(immediately) Oh yes since $f(x)$ is continuous on $\mathbb{R}$ and both these limits exists $f(x)$ must be uniform continuous!

Mam- Yes correct! Is $(sin x)^2$ uniform continuous on $\mathbb{R}$
Me- yes, since its derivative is bounded on $\mathbb{R}$

Mam- Is $sin x^2$ uniform ?
Me- No, consider two sequences $x_n=\sqrt{2n \pi}$ and $y_n=\sqrt{2n \pi+\frac{\pi}{2}}$, now $x_n-y_n \to 0$ as $n\to \infty$ but $f(x_n)-f(y_n) n\rightarrow 0$ as $n \to \infty$

(After this sir started)

Sir- Have you done Topology?
Me- Yes sir.

Sir-What do you mean by Topology?
Me-(Gave its definition)

Sir- What do you mean by Hausdorff space?
Me-(Gave its definition)

Sir-Is $\mathbb{R}^2$ Hausdorff with metric topology?
Me-(This was an easy one) Yes sir any two distinct points can be separated by two disjoint discs.

Sir- Is $\mathbb{R}$ with cofinite topology Hausdorff?
Me-(thought for a while) No, for $x \neq y$ suppose $\exists U_x, U_y$ disjoint nbds of x,y respectively, since $U_x \cap U_y=\phi \implies U_y \subset\mathbb{R} \setminus U_x$ and this is not possible since $U_y $ is infinite while $\mathbb{R} \setminus U_x$ is finite.

Mam-If X is finite , what is cofinite topology on it ?
Me-(immediately without thinking thinking much) Indiscrete.

Mam- Think again!
Me- It'll be discrete since $X \setminus U$ is always finite always for any open set U

Prof Gurmeet-Write down all the non isomorphic groups upto order 10
Me-(I was not sure whether I remember all of them or not, but wrote them all in the end)

Prof- Okay you can leave now

My Interview lasted for only 20 mins and before me they were taking interviews upto 50 mins, may be they were tired since I was last one or may be any other thing. But the good thing is that I cleared the interview :-)

I noticed that interviews in North Zone for NBHM are relatively easy than other parts of India, through this post I'd like to help other students interested in taking the exam you can comment or contact me for any help.

[Neeraj is now an Integrated PhD student at the Centre for Applicable Mathematics, TIFR, Bangalore.]

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