

EDITOR'S NOTE

Greetings from the Editorial Board of Quantum 2018-19.

We would like to thank the department for giving us the opportunity to work on the newsletter. This year Quantum will have three digital editions and one annual printed edition. In this edition we have endeavoured to display the buzz of the quarter and the truly magical talent that our department holds. We hope that it's an enjoyable read and thank all those who contributed in its making.



Anusha Ponia 3rd Year



Navya Vardhan 3rd Year



Rajlaxmi Adwant 2nd Year



Maanasee Sharma 2nd Year



Nayana Nair 1st Year



ENIGMA DAY 1

PANEL DISCUSSION

Enigma 2019, the annual inter-college academic meet of the Department of Mathematics, opened with a panel discussion on the topic 'Lifting the veil of social conditioning against Mathematics.' The event was held at the Manju Bharat Ram Hall, LSR, where students from various departments of the college as well as those of classes 9th to 12th from Blue Bells School gathered to gain the insights of experts from interdisciplinary fields. The discussion witnessed a set of four panelists from various sectors providing insights on the topic. The discussion was moderated by Dr Jyoti Darbari, an Assistant Professor of the Department of Mathematics, LSR with a teaching experience of over 18 years.

The first panelist was Ms Vidhi Nautiyal, Math Head for the junior school at The Shri Ram Millenium School Noida. The discussion was enriched greatly by her knowledge, accumulated through eight years of experience in teaching math at the primary level.

The second panelist was Dr Priti Dhawan, Associate Professor at the Department of Psychology, LSR. She systematically explained how the influence of society plays an impactful role in conditioning against math, as opposed to not certain pre-conceived biological differences.

The third panelist was Dr. Rita Malhotra, a mathematician, essayist, poet, poetry-critic and French-English translator. Also the former Principal of Kamala Nehru College, her diverse background and immense experience in the field led her to explain the link between math and poetry. She embodied a perfect example of the interdisciplinary nature of math.





She also focused on the urgency to upgrade the education system of our country and laid special emphasis on the importance of skilled teachers. The fourth panelist was Dr Jonaki Gosh, Assistant Professor at the Department of Elementary Education, LSR with 8 years of teaching experience at LSR. She encouraged students of all age groups to take up research projects as a part of their curriculum so as to explore new possibilities within the subject.

The interdisciplinary discussion also included the active participation of an internal Student's Cell, which included Khuisangmi Konghay (Second Year) and Rajshree Chandel (First Year). They highlighted the perspective of a student with respect to the topic.

In the end, the panelists enthusiastically answered the queries from the audience related to discussion.

- BY APURVAA MITTAL AND PAAVANI MANGLA (1st YEAR)

MATHSCAPE



Mathscape, the visual art event of Enigma themed 'Divergence' dwelt on the power of perspective and finding mathematical meaning in the simplest of things. With photos, paintings and captions describing the same, the event saw mathematical beauty in pictures brought about through well though out captions. Manorma Pandey from Lady Shri Ram College who won the third prize at Mathscape said, "I connected the theme to the idea that everyone is unique but complementary to each other, their ideas are different and cannot converge, and in that sense, parallel. But isn't that what makes them complementary and makes the world beautiful? However, people forget this and look at each other in terms of black and white, failing to see that at our core, in spite of our uniqueness, we're all the same."

BY NAYANA NAIR (1st YEAR)







3rd Priz

Winning Entry by Mohini Satarupa Jena, Gargi College

Priyanka Guha, Lady Shri Ram College

J 1112C

Manorma Pandey, Lady Shri Ram College

IPL AUCTION

The event, as the name suggests, was similar to the actual IPL auction. The structure of the event comprised of two rounds - the preliminary round and the main auction. The event took off with a zeal and excitement, as approximately 60-70 teams gave their best to crack the preliminary round. The two prominent features of the auction were Right to Match and the Pre-Auction Retention. The Pre-Auction Retention allowed the candidates to retain the players which their team already had from the previous year.

The participants took this as an opportunity to strengthen their respective teams. The spontaneity of the bidding process enhanced the spirit of the game throughout the event.

The Right to Match tested the problem-solving ability of the players wherein they had to solve a question to retain the currently bid player who was originally in their team. The auction continued until all the teams had bought at least eight players. The first position was bagged by Shreyansh & Shubham (IIT Delhi), and the second position by Aditya (SSCBS) & Mrigank (Sri Venkateshwara College).

"It was really a riveting experience and very well organised. This was my second IPL Auction and I learnt a lot of new strategies and tricks. I really appreciate the efforts of the organising team for managing and conducting it without any chaos." - Shubham Aggarwal, IIT-Delhi (First position)

BY MANISHIKA NEGI(2nd Year)



ENIGMA DAY 2

SHERLOCKED

One of the most awaited events of Enigma 2019, Sherlocked, witnessing large participation from students across Delhi. The heads – Anusha Ponia, Navya Saini and Suhani Mathur – along with the dedicated volunteers, made the event an igniting experience for the competing detectives. Enthusiasm was in the air as all participants got to solving the mystery in teams of two.

The first round, QUIZpicable Me was designed to test the teams' general aptitude and observation skills. The twenty teams with the highest score qualified for Round 2. The five teams with the highest scores in the preliminary round were exempted from this round. The second round, InQUIZitive, was designed to test the teams' deduction skills.

The third round, Room Escape tested how well the participants could work with their teammate in a confined space where they were to break a code to escape the room. The five teams that are able to escape the room in the shortest time proceeded to the last round.

The Scavenger Hunt was the last and final round. The competing teams had to track down a serial killer on the loose. Following a trail of clues and answering tricky questions, the first team to be able to identify the killer won the game. Excitement took over the detectives, as they rushed in and out to solve the clues.

K. Aditya and Shubham Kumar (Hansraj College) were the first to identify the killer and were declared the winners of Sherlocked.

Satwik Pasani and Srividya Pattisapu (AIIMS) bagged the second position. This event added up to the thrill of the annual academic meet of the Department of Mathematics.



WINNERS : K.Aditya & Shubham Kumar from Hansraj College





-NITYA JAISWAL (1st Year)

MONOPOLY : THE MATH EDITION

On 12th January, 2019 at Lady Shri Ram College, Monopoly: The Math Edition, introduced last year and, bigger and better this year, gave its participants jaw dropping moments. The event was in itself a brilliant idea, which incorporated both mathematics and the much loved game of monopoly. The preliminary round was based on the theme 'Renaissance in the Childhood', and comprised of many questions that one would have come across during their childhood – and also from mathematics of course. The main round began with much enthusiasm where the aim of the game was to procure five properties. Participants could own any property they landed on and in return they had to answer a maths based problem.

'Golden Speed Bump' dared the participants with various activities in order to proceed in the game. Some of the dares included air playing a musical instrument, clicking a funny picture with the monopoly man etc. Needless to say, this was the icing on the cake.

The event concluded when 'Girnar Ravages' (Akash Garg, M. Santosh, Akshat Yadav) a team from IIT-Delhi won with the help of their problem solving skills and knowledge of mathematics. The team heads Vrinda Khera and Roli Singhal left no stone unturned in the successful conduction of the event. Also, all volunteers put their heart and soul into making the event a big hit and realizing the whole motive of the event in the best manner.

-PAAVANI MANGLA (1st Year)

WINNERS : Akash Garg, M. Santosh, Akshat Yadav from IIT Delhi

PHOTO GALLERY















DEPARTMENT EVENTS

ANUPAMA DUA PAPER PRESENTATION AND SCHOLARSHIP FUNCTION 2019

The Department organised the 25th Anupama Dua Paper Presentation and Scholarship Function on 27th February, 2019. The function began with the lighting of the diya by Ms Anupama Dua's family. This was followed by the Saraswati Vandana, sung by the department's Music Committee. Thereafter, Mrs. Dua (mother of Ms. Dua) was presented a bouquet by Ms. Uma Versha Kakar.

The presentation function formally began with an introduction by the General Secretray, Rajlaxmi Adwant. She invited Mr. Dua to address the audience; he shared his fond memories of his sister and motivated the audience with his encouraging words.

The scholarship holders, from the first and second years, were the first to present their papers. The Dua family felicitated the scholarship holders.

The family was then accompanied by the faculty members to water the tree planted in memory of the late Ms. Anupama Dua.

This was followed by more presentations from students of all three years. Their explanations and efforts were appreciated by the teachers gathered.

Overall, the event was a huge success, and gave students an incentive to explore various avenues in mathematical research.

-RAKSHITA GOTHWAL (1st Year)

CAREER TALK SERIES









On 21st of February 2019, the Department of Mathematics presented its first session of a career talk series. The session was conducted by Ms. Megha Saxena, a specialist from The Princeton Review, Delhi who has been in the field for more than 8 years.

Ms. MEGHA SAXENA

(The Princeton Review, Delhi)

The session predominantly focused on higher education and career options available abroad in the field of pure and applied mathematics, statistics and management. It covered the perks of studying abroad, a comparative analysis of pursuing a masters degree in the country and elsewhere, job prospects etc. Ms. Megha also enlightened the students about the myriad of scholarships that a student could avail if s/he wishes to study abroad further. She provided the students with very effective pragmatic tips for preparing for standardised tests like GRE, GMAT etc. The one hour long event was concluded with a

The session was a very intriguing experience for all who were present, especially those who were in a dilemma regarding the feasible options available after graduation.

-NEHLA SHAJAHAN (2nd Year)

Ms. ANIKA JAIN

(Department of Mathematics, Batch 2014-17)

As a part of the Career Talk Series, an initiative of Mathematics Department, LSR, an interactive session was organized with Ms. Anika Jain, a qualified actuary and an alumna of Mathematics Department, LSR Batch of 2017. The session aimed to introduce the emerging career opportunity in Actuarial Science and to untangle the chords in the minds of students aspiring to pursue the same.

question answer session.

The session began with Anika giving a glimpse of her dilemmas at the onset of her course that soon transformed into an enjoyment, because of her determination and perseverance. Describing actuaries, she stated - *"actuaries are the saviors of financial world"*. She gave the students an insight into how vast the risk management sector is and spoke about actuarial science's unquantifiable potential as one of the best paying jobs. She alluded to the balance which this course maintains, between theoretical and practical knowledge.





A Q&A session towards the end gave students a space to get their queries and confusions attended by our much knowledgeable alumna.

The main idea behind the session – giving a head start to students' career in actuarial science – was fully realized.

-JASSIKA KAPOOR (1st YEAR)

-RADHIKA (1st Year)

ENVIRONMENT WEEK

On 25th of February, Lady Shri Ram College for Women celebrated Environment week which was received with much enthusiasm and dedication from all the departments. Our very own Mathematics department perceived it with a very different and unique notion. Our decorations were themed as PROPORTIONALITY OF GLOBAL WARMING. With the help of various articles and pictures we tried to explain how are actions are solely responsible and proportional for all the consequences we face. Apart from the theme, we also linked environment to symmetry in mathematics which was identifiable by our decorations. We also emphasized on the importance of mathematics in environment. Mathematical models and study of patterns in occurrence of natural events with the help of graphs, charts and mathematical tools are examples of some ways mathematics proves to be useful for our environment. We as students of mathematics department focused on increasing awareness about the importance of mathematics in nature as well, for instance, seeds of sunflower are produced in a Fibonacci sequence.



ARTICLES

UNDERSTANDING THE MOBIUS STRIP AFTER SCHOOL...

The Mobius Strip has definitely been one of the objects of fascination during our schooldays. On digging deeper, one finds that the concept behind the Mobius Strip is super interesting and something that we are finally in a space to understand, at the undergraduate level.

So let's start with a word: ORIENTABILITY.

What does it mean?

Orientability is a property of surfaces in Euclidean space that measures whether it is possible to make a consistent choice of surface normal vector at every point. A choice of surface normal allows one to use the right-hand rule to define a "clockwise" direction of loops in the surface, as needed by Stokes' theorem for instance. More generally, orientability of an abstract surface, or manifold, measures whether one can consistently choose a "clockwise" orientation for all loops in the manifold. Equivalently, a surface is orientable if a two-dimensional figure such as • in the space cannot be moved (continuously) around the space and back to where it started so that it looks like its own mirror image •.

To understand what it means to be orientable, consider the sphere.

Clearly this surface has no mirror-reversing effect because nobody on earth has ever returned mirror-reversed after a long journey. (A mirror-reversed person would seem to have changed handedness and would see all of our writing backwards). So presumably a sphere is orientable. The sphere also has some nice properties. You can walk in any direction on the sphere and you will end up where you started. This also means that you cannot fall off of the sphere (this is especially convenient for those of us who live on the earth). When a surface or any manifold has these properties, we say that the manifold has no boundary. But isn't the sphere itself a boundary for the space it encloses? Remember that when we talk about two-manifolds we are only considering the surface itself. For all we know, the space that a sphere encloses does not even exist. Imagine that you are a two-dimensional being living in the surface of the sphere. You have no conception of the three-space that might exist outside of your world. Your entire world simply looks like one infinite plane. Therefore, a two-dimensional being living in the surface of the sphere of the sphere would truly believe that his world had no boundary, even though it has a finite area.

Now, in contrast to this, consider the Mobius Strip. the best thing about a Mobius strip is that we can actually build it.

Just take a strip of paper and attach the ends with a single twist. You should end up with something like the following picture



The Mobius strip (also sometimes called a Mobius band) has a boundary just like the cylinder, but it only has one boundary, not two. If you trace along the edge of the Mobius strip you just built, you will cover the entire boundary, eventually returning to the place where you started. One way to represent the Möbius strip as a subset of \mathbb{R}^3 can be done using the parametrization:

$$x(r,\alpha) = \cos(\alpha) \cdot \left(1 + \frac{r}{2}\cos\frac{\alpha}{2}\right)$$
$$y(r,\alpha) = \sin(\alpha) \cdot \left(1 + \frac{r}{2}\cos\frac{\alpha}{2}\right)$$
$$z(r,\alpha) = \frac{r}{2}\sin\frac{\alpha}{2}$$

where $0 \le u < 2\pi$ and $-1 \le v \le 1$. This creates a Möbius strip of width 1 whose center circle has radius 1, lies in the *xy* plane and is centered at (0, 0, 0). The parameter *u* runs around the strip while *v* moves from one edge to the other.

Now that we have discovered one nonorientable surface we can create many more. In fact, any surface (or any manifold at all) which has a Moebius band in its structure is nonorientable.

Consider the Klein Bottle. It is a popular non-orientable surface. If you like a drink, then a Klein bottle is *not* a recommended receptacle. It may look vaguely like a bottle, but it doesn't enclose any volume, which means that it can't actually hold any liquid. Whatever you pour "in" will just come back out again.

How do you construct such a strange thing and why would you want to construct it? The mathematician Felix Klein, who discovered the bottle in 1882, described it as a surface that "can be visualised by inverting a piece of a rubber tube and letting it pass through itself so that outside and inside meet".

The Klein bottle has a mirror reversing effect just like the Moebius strip, but it also has the nice property of having no boundary so you can go off what looks to be the edge in the diagram without ever really coming to the edge.



The bottom line:

On a non-orientable surface, there's no way to consistently define the notions of 'right' and 'left' and anything that is slid around a non-orientable surface will come back to its starting point as a mirror image.

-RAJLAXMI ADWANT(2nd Year)

(Information collected from various internet sources)

ARTICLES

प्रतिबिंबि

सहज, सुलभ जिनमें झाँकते हैं कई प्रतिबिंब उन प्रतिबिंबों की परछाईयाँ भी एक के बाद एक लगातार बढ़ते, प्रतिबिंबित होते कई चेहरे चेहरों के साथ अस्तित्व अस्तित्व के साथ व्यवहार व्यवहार के साथ इंसान और इंसान के साथ उनकी प्रकृति जो प्रतिबिंबित नहीं होता है, वो है "आत्मा" मनुष्य की आत्मा दर्पण चेहरे दिखाता है खुद में झाँकना नहीं दर्पण मुखौटे दिखाता है उन्हें उतारना नहीं दर्पण वो ही दिखाता है जो आप देखना चाहते हैं आपकी हकीक़त नहीं इसलिए, झाँको, देखो, डूबो समझो खुद को बिना किसी प्रतिबिंबि के बिना किसी सहारे के पाओ अपनी आत्मा को अपने सामने शायद तब ये जितने भी प्रतिबिंबि हैं समाज, दोस्त, परिवार सभ्यता. प्रेम इन सबके प्रतिबिंबों से मुक्त हो पाओ तुम और तब शायद जान पाओ जीवन का सार और उसके साथ अपने जीवन का उद्देश्य सहज, सुलभ दर्पण उनमें झाँकते कई प्रतिबिंब मिटते कई प्रतिबिंब साफ होते कई प्रतिबिंब प्रतिबिंबि ही प्रतिबिंबि।

MY WINTER INTERNSHIP EXPERIENCE

The internship I did this winter was a new experience for me. It was at Mercados Energy Markets India Pvt Ltd. It was more like an educational internship and my favourite part was coding in R.

The project I was working on is "Forecasting hourly/sub-hourly prices for very short-term forecast time periods". Initially, my mentor gave me an option to choose some other topic which is not that statistically oriented, since I was not from core statistics background, but I wanted to challenge myself and went ahead with the topic. With extensive research and working in Excel, I was able to get into the crux of the project and understand the analysis. It was a daily one and a half hour journey from my place to my office, but it was all worth it because of the knowledge I'd gain every day. I loved coding in school, and doing it all over again in R on a subject I'm not very familiar with gave me a new perspective on how to analyse in Excel from graphs and figures, and then coding it in R.

-KUJHATIKA GHOSH (3rd Year)



PHOTO CAPTION CONTEST

A lot of things have happened this year ,

and you have had to bear more then you ever thought you would. But I just hope you know, through the difficult and good, you have also been brave in a beautiful , honest way. And no matter the progress you feel that you have not made. You are still growing here.





Far away there in the sunshine are my highest aspirations .I may not reach them but I can look up and see their beauty, believe in them and try to follow them. -AASTHA SAINI(1st Year)

-मानसी गोस्वामी 'सियाह'

Art Corner

Swasti Arya __1st Year









Mihika Chitranshi 1st Year











Manishika Negi 2nd Year

