NEWSLETTER

KALINDI COLLEGE
UNIVERSITY OF DELHI

PALETTE-O-MATH

ISSUE 07

February 2022

Index

- Principal's Message

- TIC Message

- Editor's Note

- Office Bearers

- Alumnus Speak

- Student's Article

- Events

- Teacher's Note

MESSAGE FROM THE PRINCIPAL

Education is not to be confined within the walls of a classroom, Covid-19 has proved that.

With the start of covid era which is still going on with its new effects we also started a new era of digital education.

Our faculties and students have together proved that nothing can stop a teacher to teach and students to learn even in the pandemic like this.

Mathematics department always keep the students well aware about the various activities like webinars and competitions along with the productive and enjoyable fun activities and quizzes.

Always keeping the same spirit, Mathematics department has also printed new edition of its departmental Newsletter to enlighten the students and numerous activities that kept them going forward by bringing all details of numerous competitions and webinars.

I heartily congratulate the department, faculties and students for their efforts that never let us down and bringing yet another informative Newsletter.

MESSAGE FROM THE TEACHER-IN-CHARGE

It gives me immense joy to share that Mathematics Society *ANANTATA* is doing very well. I appreciate the hard work of all students, teachers and wholeheartedly thank them for presenting the Newsletter in a very informative and attractive way.

I would also like to thank our Principal, Professor Naina Hasija for her constant guidance in carrying out our Society activities.

This Newsletter consists of various articles on current trends in mathematics meticulously curated by our editorial team. We hope it will inspire you and enrich you with practical knowledge in the field of maths. Once again, deepest gratitude to everyone for making the newsletter a great source of learning.

Ms. Neelam Bareja
Teacher-in-Charge
Department of Mathematics

MESSAGE FROM THE CONVENOR

Srinivasa Ramanujan said "An equation for me has no meaning, unless it expresses a thought of God." Our nation is celebrating 75 years of independence with theme "Azadi Ka Amrut Mahotsav" I believe young students should learn a lot from the life of great mathematicians and should be motivated by our journey of ancient to modern era to achieve pride for the nation in the field of mathematics. I am very glad that this newsletter is being released in good order and precision, credit for which certainly goes to the incessant efforts of the faculty, students and all the contributors to it.

Dr. Prempal Singh
Society Convenor
Department of Mathematics

Editor's Note

TEACHER EDITOR'S

We would like to thanks to Principal ma'am, Senior Teachers, Members of Editorial team and Contributors of articles for their contribution for seventh edition of Newsletter Palette-O-Math.
The content of this Newsletter includes latest developments in Mathematics and interesting Articles. It is proud moment for us to be part of Editorial team. This Newsletter provides a source of inspiration to students to find absorbing interest in Mathematics.

Dr. Abhishek Kr. Singh
Department of Mathematics.

Mr. Sanjay Kumar
Department of Mathematics

STUDENT EDITOR'S

I have always been grateful to be the part of this beautiful department THE MATHEMATICS DEPARTMENT.
The spirit behind it is to highlight academic aspects of this department that our intrepid editors have deemed relevant and noteworthy. My thanks to our supporting teachers who helped us unconditionally and my mates; we are always better together. Kudos to us!. We hope that you, the reader, will help us make this newsletter as useful and relevant as it can be.

MANYA CHAUDHARY
B.Sc. (H) MATHEMATICS, III YEAR

Mathematics is not just a subject...but a way of living...a lifestyle worth experiencing...The magic of Mathematics is an unavoidable part of our journey either knowingly or unknowingly...not just academically but in every possible way and to inspire the folks about this superbly incredible form of science... I, Anshika Choudhary, am delighted to present you all the annual newsletter of the department of Mathematics...to unlock the mesmerizing world of maths and adventures...

ANSHIKA CHOUDHARY
B.Sc. (H) MATHEMATICS, III YEAR

No matter which way I look at it, math came first and foremost and was at the core of my success. Science, technology and engineering, so essential to the future success of our country, cannot thrive without practitioners having a solid mathematics foundation. I, Himanshi glad to present the newsletter 2022 of Mathematics Department. I heartiest thankfully to all my colleagues and my respected teachers for giving me a chance to share my experience.

HIMANSHI
B.Sc. (H) MATHEMATICS, III YEAR

Over the past two years I have learned much about the opportunities and challenges that lies ahead of us. Our wonderful teachers and friends who always have faith in us.
Thankyou to all of you !
As we Journey together this year let us go forward in faith, and to innovate new ideas everyday.
Sharing my great experiences with you all by this marvellous newsletter.
I'm sure you'll find it interesting.

PRIYA SAINI
B.Sc. (H) MATHEMATICS, III YEAR

CHAITIKA BHATNAGAR
B.Sc. (H) MATHEMATICS II YEAR

Mathematics is not about numbers , equations, computations, or algorithms, it is about understanding. And that has been my goal to understand this genius subject to its core and also share it with people who find it difficult. And this newsletter is a perfect opportunity for this. Our newsletter has various mathematical informations that helped me also to learn so many new things. I hope it does that too for anyone who gives it a read. I am thankful to my teachers, parents , colleagues, friends and department of Mathematics that provided me with this wonderful opportunity and helped me to showcase my talent.

It gives us immense joy and satisfaction to finally re-introduce our college newsletter 2022. I along with my editorial team members have spent sleepless nights to make this magazine stand out. I express my considerable appreciation to all the authors of the article in this newsletter. These contributions have required a generous amount of time and effort. It is this willingness to share knowledge, concerns and special insights with fellow beings that has made this newsletter possible. We hope you enjoy reading this newsletter as much as we have enjoyed making it.
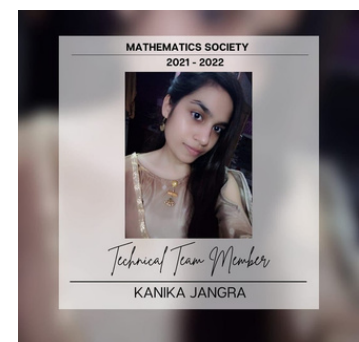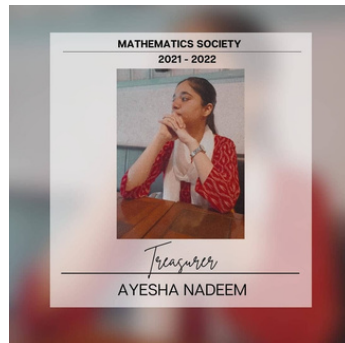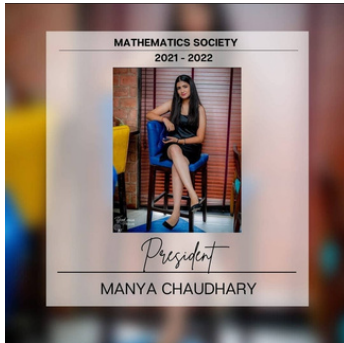
KANIKA JANGRA
B.Sc. (H) MATHEMATICS, II YEAR

Office Bearers

2021 - 2022

MATHEMATICS SOCIETY
2021 - 2022
President
MANYA CHAUDHARY

MATHEMATICS SOCIETY
2021 - 2022
Vice - President
TANU JHA

MATHEMATICS SOCIETY
2021 - 2022
Secretary
PRIYA SAINI

MATHEMATICS SOCIETY
2021 - 2022
Treasurer
AYESHA NADEEM

MATHEMATICS SOCIETY
2021 - 2022
Technical Team Head
ANSHIKA CHOUDHARY

MATHEMATICS SOCIETY
2021 - 2022
Second Year Representative
NEERU MANN

MATHEMATICS SOCIETY
2021 - 2022
Third Year Representative
EKTA SINGH

MATHEMATICS SOCIETY
2021 - 2022
Technical Team Member
HIMANSHI

MATHEMATICS SOCIETY
2021 - 2022
Technical Team Member
CHAITIKA BHATNAGAR

MATHEMATICS SOCIETY
2021 - 2022
Technical Team Member
KANIKA JANGRA

ALUMNI SPEAK

In a tiny cell enters a shy, timid teenager. Riddled with doubts, bursting with life, gleaming with the newfound freedom in her eyes, she watches that cell aka her hostel room in awe. She sees the falling plaster, wipes the sweat beads down her brow, and pulls the mattress up onto the bed. She is meticulously arranging her stuff in the cupboard when there is a sudden knock on the door. She finds her reflection there. Struggling with overflowing bags, first looking at the room and then at her in awe. Gazing at each other with lips twisting into a gentle smile, they wonder together, "Are they crazy? How are we ever going to survive in this space?"

What follows next? The most memorable chapter of their story at DU. The room surprisingly grows with every passing day, the space becomes larger with every fun night-out, and every last-but-yet another all-nighter for the next major exam. The falling plaster seems a work of art, and the ruthless Delhi-heat a delight in front of the next canteen meal.

When I first entered Kalindi College I was anxious about my future. Over the three years, so many doors were opened for our personal and academic development that I became confident. KC had contributed a major part in my career building. The staff and the teachers are very passionate and show genuine desire to help students to achieve their goal. So in KC one is not just a bookworm but a real thinker!

"

They say time accelerates swiftly when you are enjoying the moment. Then why does life at KC, during those days, seem an eternity? It trickles down slowly through your grasp, with moments sweet and bitter. And leaves an irreplaceable hollow once you graduate.

"

YASHIKA JAIN
BATCH 2018-2021

ALUMNI SPEAK

It would be difficult to sum up my three years at Kalindi in just a few lines. I believe that the achievement of an organization is a result of combined efforts of each individual. I belong to a small town and it was a whole new experience for me. My actual growth started from my college life. I took admission in Kalindi College in 2018 and during my three years long stay made some great friends , was taught by extremely effervescent professors , who are pretty much instrumental in shaping me as an individual .These three years were the most tremendous years of my life. At Kalindi , I got to learn from the brightest minds. Teachers here make your life easy by making you understand things in a very simple way. College is one of the

memorable parts of a student's life whether it was about friends, professors or growth of life. We have to make so many decisions as it will make an impact on the career and future of one's life.

I have so many memories with every professor and those days I count as the best days of my life. Apart from our studies I was also a part of the Maths Department. Also I have held the post of Treasurer and President of the Maths Department of the college and it was the best experience for me. I learned a lot of new things from all this. Even our Annual fest was successfully conducted online with the guidance of our teachers and with the help of my office bearer's team. It would never end if I pen down about my college life and friends. My class was the best in terms of study and drama. I had so many memories with these people Yashika , Himani , Muskan ,Tamanna , Deepika and many more friends and my juniors were like younger siblings. Lectures, canteen moments to events in the college, I found them all as part of memories which I will always cherish.

"

Thank you Kalindi and Mathematics department for those 3 best years of my life. I am thankful to witness another issue of our newsletter. so last but not the least Kalindi we will miss you.....!!!!

"

KIRTI AGARWAL
BATCH 2018-2021

ALUMNI SPEAK

My days at Kalindi remind me of the colorful stage, the vibrant classrooms and the super
supportive faculty. I want to say thanks to Kalindi who listened without judgment, spoke without
prejudice, helped me without entitlement, understood without pretension and loved me without condition.

I especially want to thank the teachers of the Department of Mathematics who gave the right
direction to our career. They showed the right path not only for our studies but for our character too.

"

Today when I look back at those three glorious years of my life where I learned and got trained,
I feel blessed and thankful to attain such experience in my life.

"

MUSKAN
BATCH 2018-2021

Articles

Writeups That Inspire

LIFE'S EXTREMES : MATHS VS LANGUAGE.

Do you know what "abecedarian" means? What about the solution to 250 x 11? Most people would agree they are better at verbal or math subjects in school, as grades usually do attest. Highly intelligent individuals often do well in both subjects, and may know the answers to both questions above, lickety-split, while less intelligent people can struggle. But a minority of us excel in the language department and bomb at mathematics, or vice versa.

(As an adjective, abecedarian refers to something relating to the alphabet; 2,750 is the solution to the equation.)

These extremes inability to speak (or equate) to the very makeup of our brains. "The brain systems for maths and language are quite different," said Brian Butterworth, emeritus professor of cognitive neuropsychology at University College London, using British English's dialect for "math". "So perhaps it is not surprising that these two capacities are rather independent."

By learning more about the parts of our brains responsible for language and math processing, researchers hope to someday better help those with severe deficits, such as in reading ability, called dyslexia, and general numeracy, called dyscalculia.

Wordly wise

Verbal ability — reading, writing and speaking — arises from across much of our brain, requiring key elements to harmonize.

When we read, for example, the "ventral stream" located at the rear of the head and involved in object recognition becomes active. Parietal (on the side) and frontal regions activate as well, as revealed by neuroimaging studies. These brain areas figure out the "sounds" of letters and the semantics of words. [Inside the Brain: A Journey Through Time]

In about 5 percent to 12 percent of the population with dyslexia, reading is fraught with difficulty. Spelling is sometimes a problem, too. An unknown percentage of the population also grapples with so-called dysgraphia, an inability to write. Dysgraphics make ill-formed letters with improper spacing, or produce the wrong word for a concept, such as "girl" or "boy" instead of "child."

Brain injuries can also cause these verbal deficits, same as with math. Genetics, though, clearly has a profound impact, based on learning disabilities running in families and genetic ailments that produce clear deficits.

In the case of well-studied dyslexia, several candidate genes have emerged that code for how neurons in the brain form interconnections.

"The idea is that throughout gestation and early development, neurons traveling to where they should be going don't reach their targets," said Guinevere Eden, director of the Center for the Study of Learning at Georgetown University Medical Center, who studies dyslexia.

**Himanshi
III Year**

MATHEMATICS :
A SECRET WEAPON FOR SOLVING CRIME

Countless movies and TV dramas have taught us the importance of crime scene investigation. What's less well-known, though, is the fact that maths has an important role to play in this.

How do bloodstains tell us where a crime is committed?

Bloodstains provide a lot of clues about what happened on the crime scene. Bloodstain pattern analysis (BPA) is the interpretation of bloodstains at a crime scene to recreate the actions that caused bloodstains. Elements of biology, physics, and mathematics are used to help determine the source of blood and the positions of the victim and perpetrator. We will be looking at impact stains and passive stains. Impact stains result from blood projected through the air, whereas passive stains result from the effect of gravity on a body. These can result from stabbings, beatings, and gunshot injuries. When blood droplets strike a surface, the shape of the bloodstain depends on the angle of impact and the distance travelled.

The shape and tail of the bloodstain indicates the direction the blood was travelling in. Imagine there are three bloodstains on the floor, as shown in the diagram below. Also imagine all these stains came from the same source (e.g. someone being hit over the head).

Now imagine drawing lines through the bloodstains in accordance with their direction of travel: these lines will meet in a point P. The true source of the blood (e.g. the head of the person who was hit) will have been somewhere vertically above P To find out at exactly what height, we need to do a little more geometry. If blood were to drop vertically down onto a smooth surface, so that the trajectory of the blood makes a 90° angle with the surface, it would create a circular shaped drop. If blood were to drop obliquely to the floor, at an angle less than about 70°, it would form an elliptical shape with a tail.Then, by using the Law of Sine, angle of impact of the blood drop can be found, and later calculate the height of the source of blood using the law of tangents.
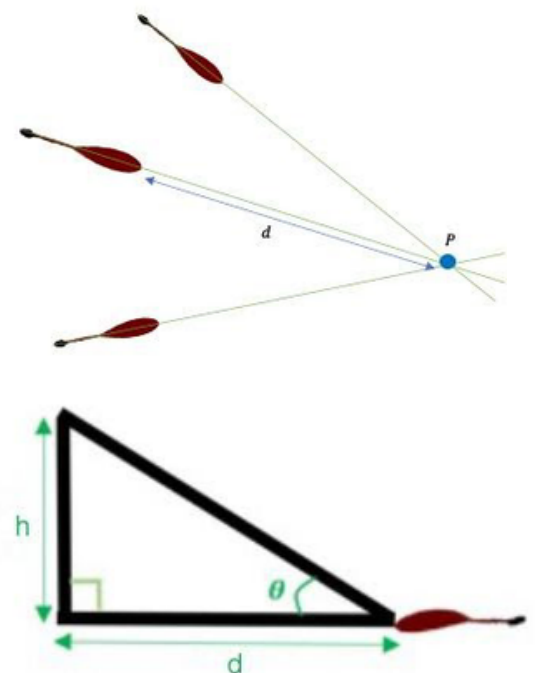
Since we know the value of Θ and the distance d, we can work out h, the height of the source. If you already know for example, that the blood comes from a victim being hit over the head, this information can indicate whether the person was standing up while this happened, or was beaten while already lying on the floor.
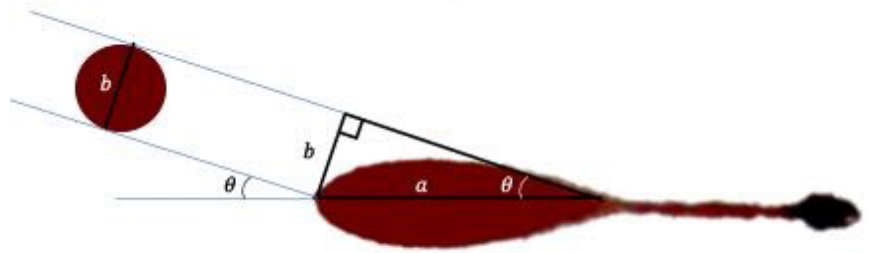
The outputs produced with blood pattern analysis can be used to corroborate witness statements and laboratory findings. It is surprising that something as basic as trigonometry can tell us a lot about what happened at the crime scene.

Falling Bodies : Suppose a body is found at the foot of a block of flats. Was it an accident, suicide or murder? Using the measured distance from the building together with some elementary geometry and dynamics, the forensic scientist can form an opinion as to whether the victim fell, jumped or was pushed. Ballistics calculations, like computing the ricochet angle of a bullet bouncing off a solid surface, use trigonometry. Bullet trajectories determine the distance from shooter to target and perhaps the height of the gunman and where he was standing when he shot his victim.

The exponential and logarithmic functions, found throughout science, play a key role in forensics. The exponential function relates to processes that depend on the amount of material present as time changes. Rates of heating or cooling, or of the metabolism and elimination of alcohol and drugs, are governed by exponential rates of changes. Furthermore, hairs are often discovered at crime scenes, however, only using math can determine whether it is a human or an animal hair. You can do so by calculating the ratio of the diameter of the medulla (middle, pigmented section of the hair) to the diameter of the entire hair. An animal hair parades a ratio of ≤.5, while a human hair parades a ration of ≥.5.

AAYUSHI SINGH,
III YEAR

UNDERSTANDING THE WORLD THROUGH MATHS.

The body of knowledge and practice known as mathematics is derived from the contributions of thinkers throughout the ages and across the globe. It gives us a way to understand patterns, to quantify relationships, and to predict the future. Math helps us understand the world — and we use the world to understand math.

The world is interconnected. Everyday math shows these connections and possibilities. The earlier young learners can put these skills to practice, the more likely we will remain an innovative society and economy.

Algebra can explain how quickly water becomes contaminated and how many people in a third-world country drinking that water might become sickened on a yearly basis. A study of geometry can explain the science behind architecture throughout the world. Statistics and probability can estimate death tolls from earthquakes, conflicts and other calamities around the world. It can also predict profits, how ideas spread, and how previously endangered animals might repopulate. Math is a powerful tool for global understanding and communication. Using it, students can make sense of the world and solve complex and real problems.

For students to function in a global context, math content needs to help them get to global competence, which is understanding different perspectives and world conditions, recognizing that issues are interconnected across the globe, as well as communicating and acting in appropriate ways.

Math is often studied as a pure science, but is typically applied to other disciplines, extending well beyond physics and engineering. For instance, studying exponential growth and decay within the context of population growth, the spread of disease, or water contamination, is meaningful. It not only gives students a real-world context in which to use the math, but helps them understand global phenomena – they may hear about a disease spreading in India, but can't make the connection without understanding how something like cholera can spread in a dense population. In fact, adding a study of growth and decay to lower level algebra – it's most often found in algebra II – may give more students a chance to study it in the global context than if it's reserved for the upper level math that not all students take.

In a similar vein, a study of statistics and probability is key to understanding many of the events of the world, and is usually reserved for students at a higher level of math. But many world events and phenomena are unpredictable and can only be described using statistical models, so a globally focused math program needs to consider including statistics.

EKTA KUMARI

III Year

THINKING AND WORKING MATHEMATICS

Mathematics has evolved over the years. Earlier it was thought that to be good at Mathematics, one has to be quick and should be able to recall multiplication tables. However, now the scenario has changed. Today, need of the hour is to have the ability to solve problems, reason and work together as a team. From the huge volume of research around cognitive science it has been concluded that people learn by making mistakes. Mathematics is an abstract subject. It is often tricky to see why things happen. It must be understood that most of the times, final answer to a question is not what matters. What matters is the procedure adopted to solve a question. At times there are many ways of solving the same problem. ' Thinking and Working Mathematics' help us to see beyond getting the answer right, it encourages us to find multiple solutions, to look for patterns, to offer conjectures , to communicate our thinking and ultimately to solve problems we have never seen before. The most important part of being successful at Mathematics is to believe you can do it. Confidence doesn't come when you know the answers to all the questions but it comes when you have the confidence that you can answer all the questions

GUNJAN

II YEAR

ACTUARIAL SCIENCE

Actuarial science is the discipline that applies mathematical and statistical methods to assess risk in insurance, finance and other industries and professions.

It is very less known field of mathematics. But, it is becoming more and more popular among math-loving students looking for ways to use their skills after college. According to IAI (Institute of Actuaries of India), there are only 9182 students, 160 associates and 344 fellows in India. The demand for qualified Actuaries is much higher than their salary and hence, the average salary in this field is quite high. People can work in multiple areas in both private and government sectors.

Actuarial science is a viable and highly rewarding career option for individuals willing to translate their knowledge of risk assessment into a full-time vocation. Actuarial science is suitable for those who like to rely on cold hard facts to solve a problem.

Actuary in India typically works in the following fields:
- Life Insurance
- General Insurance
- Health Insurance
- Reinsurance Companies
- Pension Funds
- Consultants
- Investments
- Government
- Academics
- Risk Management

To become an actuary, you need to pass actuarial exams and have 3 years of practical work experience. Passing exams will require students to have application skills as just mugging up the study material will not make them pass exams. Actuarial science is a distant learning program. One shall have to study on his/her own. There are, though, some coaching institutes which provide coaching for actuarial subjects.

There are 13 colleges in India that offer actuarial courses, Christ University, Kerala University, Chandigarh University are among the top colleges that offer actuarial courses.

An aspirant can engage himself in investment firms, hospitals, large corporations, government departments, consulting firms etc after pursuing a degree in any of the actuarial courses for which you can get around INR 5-10 lakhs per annum.

Becoming an Actuary in India requires a firm determination and a knack to do the course and pursue your goals.

KANIKA
II Year

"MATHEMATICS IS THE LANGUAGE IN WHICH GOD HAS WRITTEN THE UNIVERSE." - GALILEO GALILEI

We heard them say - "Science and faith cannot coexist; the voice of reason or the voice of faith, must drown out the other." So what to choose and what to abandon?

Well, I will not discard either. Instead I will say that I need both science and religion, the former to help me invent wonders and the latter to bequeath me with moral conscience to not misuse the inventions.

What is the largest number your mind can conceive? What is the size of the universe? The answer to both these questions is the same. The answer is not infinity, it is ZERO. Yes! The size of the universe is zero and so is the largest number! I know it's difficult to comprehend but let me explain. For every positive number there exists a negative number in Mathematics. For every matter there exists an anti-matter in nature. This is the biggest picture. Therefore, when you put everything together, the size of the universe is zero. Zero is thus simultaneously everything as well as nothing. That's why it is called a whole number. You add or remove anything from this whole, it still remains a whole.

So, this is where I am reminded of a famous quote by Albert Einstein - "Science without religion is lame, religion without science is blind."

The history of zero satisfies the quote brilliantly. In India, the Sanskrit word for "empty" or "blank" is "Sunya". This Sunya is transliterated, within the Indian system of numerology, as the idea of zero and indeed the symbol "0", it suddenly takes on an appropriateness to the notion of nothing, even pictographically. For, at the center of its circumference is a blank similar to the void in the center of the sky. This profound correlation between Mathematics and nature can be used to explain the evolution of religion. Math and religion are fundamentally similar, as they both try to seek truth and use faith to find it. Math proofs have always lent a helping hand to explore nature allowing us to procure reasons behind religious beliefs. Therefore creating more belief in both math and religion. Progress in each allows a person to be more patient and faithful to discover more about unsolved mysteries of nature.

"AN EQUATION MEANS NOTHING TO ME UNLESS IT EXPRESSES A THOUGHT OF GOD."
-SRINIVAS RAMANUJAN

KIRTI
II Year

MACHINE LEARNING HELPS MATHEMATICIANS MAKE NEW CONNECTIONS

Machine learning is the need of the hour.Hence for the first time, mathematicians have partnered with artificial intelligence to suggest and prove new mathematical theorems. The work was done in a collaboration between the University of Oxford, the University of Sydney in Australia and DeepMind, Google's artificial intelligence sister company.

While computers have long been used to generate data for mathematicians, the task of identifying interesting patterns has relied mainly on the intuition of the mathematicians themselves. However, it's now possible to generate more data than any mathematician can reasonably expect to study in a lifetime. Which is where machine learning comes in. To the surprise of the mathematicians, new connections were suggested; the mathematicians were then able to examine these connections and prove the conjecture suggested by the AI (Artificial Intelligence). These results suggest that machine learning can complement mathematical research, guiding intuition about a problem.

Using the patterns identified by machine learning, mathematicians discovered a surprising connection between algebraic and geometric invariants of knots, establishing a completely new theorem in the field. They used the connections made by the AI to bring them close to proving an old conjecture about Kazhdan-Lusztig polynomials, which has been unsolved for 40 years.

Professor Andras Juhasz, of the Mathematical Institute at the University of Oxford and co-author on the paper, said: 'We have demonstrated that, when guided by mathematical intuition, machine learning provides a powerful framework that can uncover interesting and provable conjectures in areas where a large amount of data is available, or where the objects are too large to study with classical methods.'

Professor Marc Lackeby, of the Mathematical Institute at the University of Oxford and co-author, said: 'It has been fascinating to use machine learning to discover new and unexpected connections between different areas of mathematics. I believe that the work we have done that machine learning can be a genuinely useful tool in mathematical research.'

'Intuition can take us a long way, but AI can help us find connections the human mind might not always easily spot.'

AYSHA NADEEM
II YEAR

MÖBIUS STRIP: INSIDE IS THE OUTSIDE

It's 2011 and a video (or rather we say, a story) 'Wind and Mr Ug' takes the whole internet by storm. In her video, Vi Hart has, in a most beautifully clever way, illustrated about two friends who always failed to meet each other. While every person must have scratched their heads at least once while watching the video, we'll make sure it isn't the case next timeIn case you haven't yet worked it out, it's a world based on a Möbius strip.

WHAT IS A MÖBIUS STRIP?
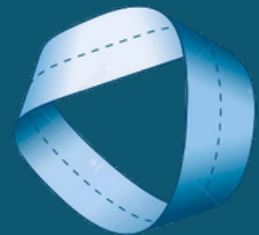
Möbius strip is a one-sided surface that can be constructed by affixing the ends of a rectangular strip after first having given one of the ends the half twist(s).This space exhibits interesting properties, such as having only one side and remaining in one piece when split down the middle. It is an object that defies common sense and our prejudices about what is intuitive.

 While the strip certainly has visual appeal, its greatest impact has been in mathematics, where it helped to spur on the development of an entire field called topology.

WHAT IS TOPOLOGY?

Mathematically, topology is a mathematical discipline which gives precise formulations for the concept of a general spatial structure and deals with all the properties of a space that are invariant under one-to-one bicontinuous mappings.In simple words, it is a study of properties of objects that are preserved when moved, bent, stretched or twisted, without cutting or gluing parts together.

Möbius Strip is a very common example of the topics studied in the field of topology. A topological property which distinguishes a Möbius Strip from a two-sided loop is Orientability. Möbius Strip is non-orientable(A space is non-orientable if 'clockwise' changes into 'counter-clockwise' after running through some loops in it & coming back to the starting point.)
Topologically, the Möbius strip can be defined as the square [0,1]x[0,1] with its top and bottom sides identified by the relation (x,0)~(1-x,1) for 0<x<1.

PROPERTIES OF MÖBIUS STRIP

A single continuous curve traverses the entire boundary.
Cutting a Möbius strip along the centre line with a pair of scissors yields one long strip with two full
twists in it, rather than two separate strips; the result is not a Möbius strip. Similar results can be obtained by giving the strip half twists.
A strip with N half-twists, when bisected, becomes a strip with N + 1 full twists.
The Möbius strip has only one boundary, which can be demonstrated by tracing the edge of the Möbius strip with your finger, by following the boundary line with your finger, when your finger has travelled the length l of the band, it will be on the boundary edge of the Möbius strip directly opposite from the starting point, and by continuing to trace the boundary edge, your finger will return to the starting position after travelling a total distance of 2l.

APPLICATIONS IN REAL LIFE:

- A compact möbius resonator
- An inductionless resistor
- Möbius aromaticity
- The symbol representing the 3R's of Environment is a Möbius Strip
- In music theory, the space of all two-note chords, known as dyads, takes the shape of a Möbius strip; this and generalisations to more points is a significant application of orbifolds to music theory.
- A number of ROLLER COASTERS also follow the concept of möbius strips

YASHI YADAV AND ANUSHKA ADARSH
II YEAR

Freshers 2021

Miss Freshers -

KOYANA MISHRA

Miss Talented

Gunjan

Karuna

Miss Personality -

CHAITIKA BHATNAGAR

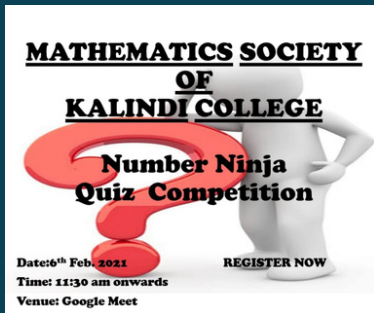# Math-e-Magic'21

February 06, 2021

Mathematics Society of Kalindi College, organised the inter college Mathematics festival, Math-e-Magic on February 06, 2021, in virtual mode using Google Meet. The festival provided an opportunity to bring together great minds in Mathematics, to further the cause of progress and development of Mathematics in COVID times as well as enhancing their holistic strengths.

The Department was honored to have the presence of Prof. (Dr.) Shalini Arora, Professor and Head, Department of Management and Chief Warden, IGDTUW.

The following events were held during the festival Math-e-Magic:
- Number Ninja (Mathematical Quiz)
- Mathematical Rangoli
- Video Making
- Open Mic
- Poster Making

Math-e-Magic'21

WINNERS

FIRST PRIZE Team Numbersome,Team Saitama,Team Factorial

SECOND PRIZE:Team Quizzer girls,Team Be limitless

THIRD PRIZE:Team Trig-stars,Team CosYNot

NO. OF TEAMS: 14

WINNER

Akansha Sharma,
B. Sc.(H) , Mathematics Ist year,
Daulat Ram College

NO. OF TEAMS: 07

THEME: LOCK DOWN CHRONICLE-IMPACT OF LOCKDOWN ON DAILY LIFE (POSITIVE/NEGATIVE).

WINNERS

FIRST PRIZE Bhawna Chauhan Sanjana

SECOND PRIZE:Jaishree Rana, Garima Singh

THIRD PRIZE:Shreya Jaiswal, Kalpana

NO. OF TEAMS: 14

Math-e-Magic'21

Mathematics Society of Kalindi College presents
MATH-E-MAGIC'21
Rangoli Making Competition
Date: 6 February 2021
Time: 1:30 pm onwards
Venue: Google Meet

WINNER

Muskan Kumari
Ramlal Anand College
Prize: 1000/-

NO. OF TEAMS: 04

WINNERS

FIRST PRIZE Preeti Singh, B.Sc.(H) , Chemistry 3rd Year, Shaheed Rajguru College of Applied Sciences for Women

SECOND PRIZE:Manasvi Sachan, B.A.(P), 2nd year, Kalind College

THIRD PRIZE:Team Anvesha Kushwah, B.Sc.(H), Mathematics, (2nd year, Hansraj College

NO. OF TEAMS: 14

we invite you to join
MATH-E-MAGIC
OPEN-MIC
presented by
MATHEMATICS SOCIETY OF KALINDI COLLEGE
// Feb 6, 2021 | 3:30 pm onwards //
// Register now! //

Farewell 2021

(June 25, 2021 | 11am Onwards)

Miss Farewell

Ankita Kumari

Miss Elegant

Kirti Aggarwal

Miss Talented

Samridhi Kapoor

Teachers' Day

Sep 7, 2021 | 2PM Onwards
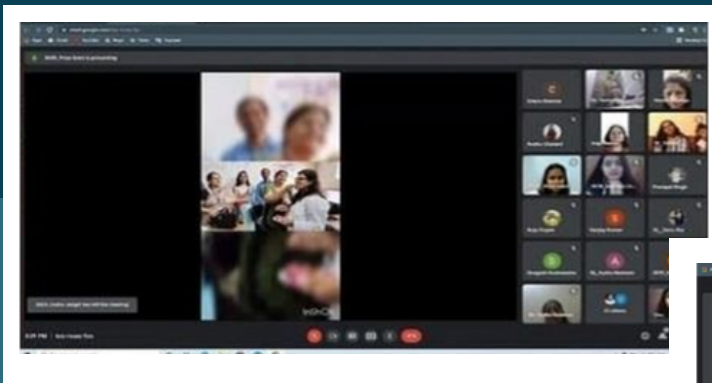
You Guided Me,
You Supported Me
Thanks For Every
Thing Teacher

83
Tell any funny memory of
your college time

PAPER PRESENTATION 2021

Oct 09, 2021 | 11:30 AM onwards.

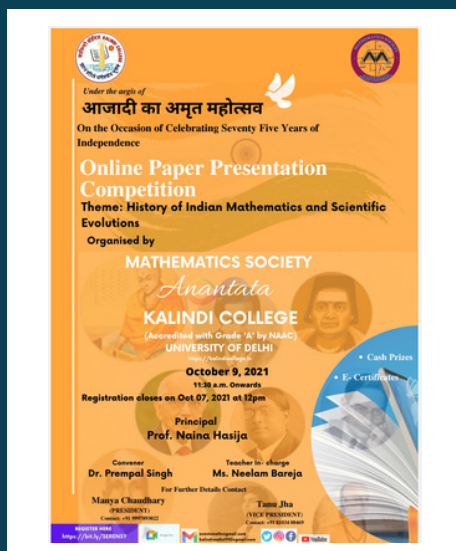EXTERNAL JUDGE - Dr. Anuradha Gupta,
（ Associate Professor, Delhi College of Arts & Commerce ）

INTERNAL JUDGES - Ms. Charu Khanna & Dr. Abhishek Kumar Singh

Total Number of Teams – 25
Total Number of Participants - 40

Teams from Kalindi College - 12
Teams from other Colleges - 13
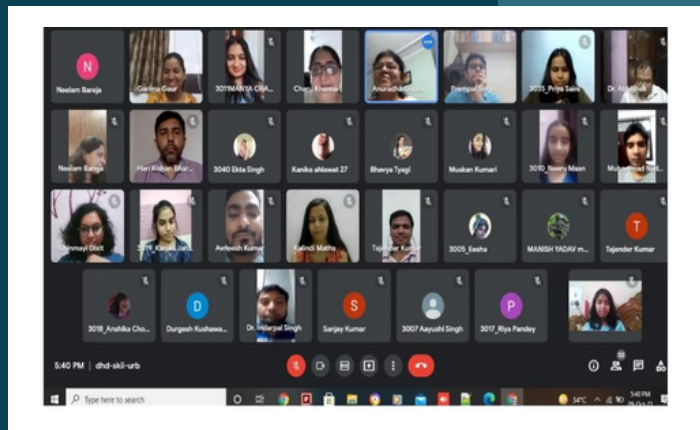
WINNERS

👑 **1st PRIZE: Kanika Ahlawat and Upanshi Agarwal**
(BA Program in Economics and Mathematics, Kalindi College)
TOPIC: Interconnection in Mathematics-simplicity of Maths

👑 **2nd PRIZE: Bhavya Tyagi and Chinmayi K Dixit**
(BA Prog (Geography + Mathematics), Kalindi College)
TOPIC: Fibonacci Sequence

👑 **3rd PRIZE: Sourav Yadav**
(B.Sc. (Hons.) Computer Science, PGDAV College)
TOPIC: History of Indian Mathematics and Scientific Evolution

Consolation Prize: Eesha and Riya Pandey
(B.Sc. (Hons.) Mathematics, Kalindi College)
TOPIC: Applications of Group Theory in real life

NEENA GUPTA: SHINING EXAMPLE FOR YOUNG LEARNERS.

PROF. NEENA GUPTA, a Mathematician at the Indian Statistical Institute - ISI in Kolkata, has been awarded the 2021 DST-ICTP-IMU Ramanujan Prize for Young Mathematicians from developing countries for her outstanding work in Affine Algebraic Geometry and Commutative Algebra.

Four Indians to-date have been honored with this award, two women and two men. This award was started in 2005 by International Centre for Theoretical Physics, Italy. It is backed by the Ministry of Technology, Government of India, the Norwegian Academy of Science and Letters, and the International Mathematical Union.
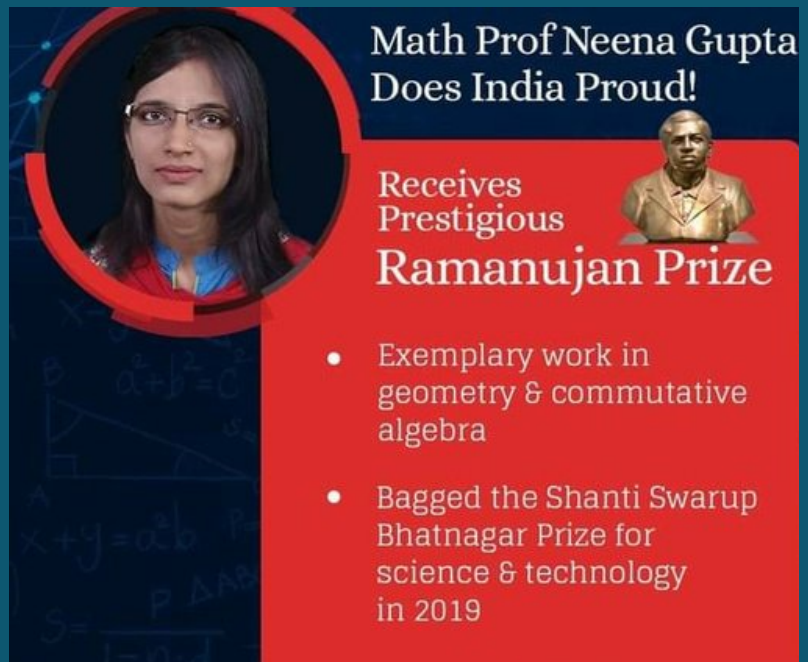
Professor Neena Gupta solved Zariski's cancellation Problem to win the Ramanujan Prize For 2021. Ramanujan Prize was first awarded in 2005. It is given to researchers less than 45 years of age from developing countries in the field of mathematics. The prize is named after the phenomenal Indian mathematician Srinivasan Ramanujan. This journey was not a piece of cake for her. Here are points that will take you through her journey.

Neena Gupta is the third woman in the world and the fourth Indian to receive the Ramanujan Prize. Neena Gupta has been recognized for her commendable work in commutative algebra and affine algebraic geometry, especially for solving Zariski's Cancellation Problem. The Zariski's Cancellation Problem was one of the world's Greatest mathematical problems. It is a fundamental problem in algebraic Geometry. In 2009, when Neena was a PhD. student at the Indian Statistical Institute, she introduced her idea to crack Zariski's Cancellation Problem to her professor. But Her professor advised her to drop the idea and called it a "waste of time". In 2012, she found a workable solution to the problem, and won the Indian National Science Academy's Medal for Young Scientists for the same in 2014. In an interaction with India Today, Neena said, "Mathematics is not Difficult. Unlike other subjects, one can't memorize and no one can spoon-feed you. If your Concept is clear, even you can solve the problems. Practice is the key. There is no other mantra. The more you practice, the more your mind will open up. Once you start doing it, it will Start generating your interest and you will fall in love. What happens is when you get scared of
Mathematics and you start ignoring it."

When asked about her future plans, Neena said that this is not the end; instead, it is the beginning. She said that there are many unsolved problems in the world of mathematics. "I need to teach my students and learn from them. One needs to keep learning; there is no end to it," said Gupta.

Neena completed her Ph.D, in 2011 in commutative algebra under the guidance of Amartya Kumar Dutta. She told her father that she needed 5 years to Complete her Ph.D. But like her father believed, she completed it within 2 years only. Neena studied at Khalsa High School in Dunlop, Kolkata. She studied Bachelor of Science in Mathematics at Bethune College, Kolkata. Later, she completed Her masters and Ph.D. in mathematics from the Indian Statistical Institute, Kolkata, where she works as a professor Now, in several media interactions, Neena mentioned that her family is really supportive. She and her family are proud of this achievement.

Greetings,
Dr. Neena Gupta!
The whole nation is very proud of you. You are indeed a shining example for young learners!

Math Prof Neena Gupta Does India Proud!

Receives Prestigious Ramanujan Prize

- Exemplary work in geometry & commutative algebra

- Bagged the Shanti Swarup Bhatnagar Prize for science & technology in 2019

Dear Students,
Wishing you a very fruitful year ahead. May all your dreams come true. Remember..its always the fire inside you that will light your way as you walk along the path to success. Take the challenges with gusto that this pandemic has brought forth in your life. Only those people shine who have the correct attitude with the required aptitude.. and reach the right altitude.

Many blessings.
Cheerio.

Prof. Anju Gupta

MATHEMATICAL MODELLING OF COVID- 19 SPREADING WITH ASYMPTOMATIC INFECTED AND INTERACTING PEOPLES IN INDIA

The pandemic came with uncertainty and implications on all aspects of business across the world. Despite India being ahead of most countries in being able to implement work-from-home measures, specifically in white collar work, job and earning deficits, along with instability in prices was expected. The months of the lockdown resulted in the free fall of employment. Understanding and predicting novel coronavirus (COVID-19) has become very important owing to the huge global health burden. The increasing worldwide infection of coronavirus disease is a major concern of every person on globe and it is very important to know it's dynamic as soon and as much as possible. Recently, several mathematical, computational, clinical and examination studies have been put forward for modeling, prediction, treatment and control of the disease, there is still room for improvement. In recent days, modeling novel coronavirus disease has become of extreme importance and several mathematical and computational researches have been proposed for the prediction of the disease dynamics. The mathematical modeling often requires computational tools and dynamical analysis that play an important role in controlling of any disease.

On consistent efforts of the central and state governments (in the direction of imposing and implementing strict lockdowns, ensuring effective supply chain mechanisms for medical equipment and installing numerous oxygen plants) and some private organizations, the situation has started improving in terms of number of new cases recorded per day.
The first case of the COVID-19 disease dates back to November 17, 2019. The first person to have supposedly caught the infection was identified as a 55-year-old man in the Hubei Province of Wuhan, China. It was declared a pandemic by the World Health Organization on March 11, 2020.

All extensive studies carried out at the leading institutes and laboratories of the world support the statement. With the limited study that has been carried out so far, it appears that those with co-morbidities such as diabetes, hypertension, cancer, cardiovascular diseases, and asthma are more susceptible to getting the virus. Further, people suffering from respiratory diseases for which air pollution is either a cause or an aggravating factor tend to develop a much more serious medical condition upon catching the infection. Such diseases include: Chronic obstructive pulmonary disease, asthma, and lung cancer.

Naturally, people living in areas with a consistently poor quality of air and perpetually high air quality index (AQI) for prolonged durations are likely to have weaker respiratory systems, thus being the ones more severely affected by the pandemic. It is, therefore, not difficult to conclude that air pollution and similar factors play crucial roles in deciding the fate of the co-morbid/multi-morbid section of the population.
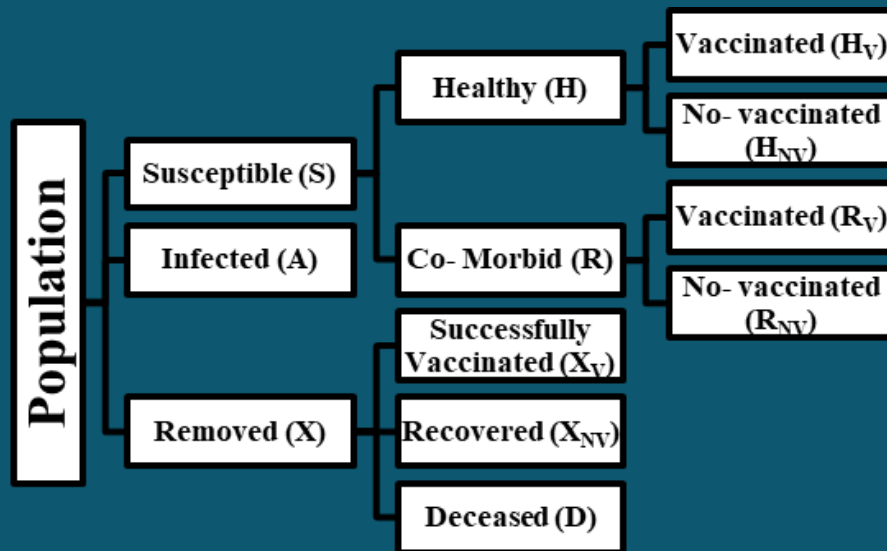
The Mathematical Modelling of Covid- 19 is an attempt to capture the current situation in India in a similar direction, wherein we can include all the aforementioned factors and study how different sections of the human population interact when put under the threat of a contagious or highly infectious disease.Model Assumptionssegregate human population data under different heads on the basis of several factors, the major ones being their current medical condition and past medical history and the fact if they have been vaccinated against the virus.The diagram describes this segregation and mentions the symbols.

- *"Susceptible"* (S) population is the section of the population that has not caught the infection yet, but is prone to it, due to the COVID-19 patients around them.
- *"H"* represents the healthy population, and is divided into two sub-sections:
    i) HV (Healthy, Vaccinated) and
    ii) HNV (Healthy, Non-Vaccinated).

Similarly
- *"R"* represents the population with co-morbidities or multi-morbidities, and is divided into two sub-sections:
    i) RV (Co-morbid, Vaccinated) and
    ii) RNV (Co-morbid, non-Vaccinated)

"A" represents the active cases, or the people who are suffering from COVID-19 at the point of time under consideration.

The third chamber is the *"Removed compartment"* (X). It includes people who have been removed from the system, due to one of the three given conditions:

- They have been *"successfully"* vaccinated, and the antibodies, so developed, continue to provide immunity (or, protection) against COVID-19 at the present moment,
- they have recovered from the infection due to the treatment provided and antibodies provide protection from the disease, or
- they could not survive the infection, that is, the deceased ones. and are positive real numbers lesser than unity, and represent the fraction of the successfully vaccinated and recovered people in the *"Removed compartment."*

This setting can be visualized with the help of a compartmental diagram and one can develop a mathematical model for Covid- 1

Dr. Prempal Singh

HISTORY OF FUNCTIONS

The term "functions" first appeared in 1692 in a mathematical article Acta Eruditorem to denote various tasks that a straight line may accomplish with respect to curve, such as
forming a chord, tangent or normal. The article was attributed to Leibnitz, a German.

Leibnitz gave the term "function" a more specific meaning by letting it denote the slope of a curve.

The Swiss mathematician Euler in 1749 defined a function as a variable quantity that dependent upon another quantity, thereby approaching today's definition.

Euler's definition was challenged when the French physicist and mathematician Fourier in 1822 presented his work on heat flow. For his investigations, Fourier introduced series with sines and cosines as terms, which led to the concept that a given representation of a function may be valid for only a certain range of values.

The German mathematician Dirichlet in 1837 proposed that from the mathematical point of view, a function is a correspondence that assigns a unique value of the dependent variable to every permitted value of an independent variable (a function is an association between two or more variables, in which to every value of each of the independent variables, or arguments, corresponds exactly one value of the dependent variable).

Dr. Abhishek Kr. Singh

IMPETUS

Alumni interaction
29 January 2022
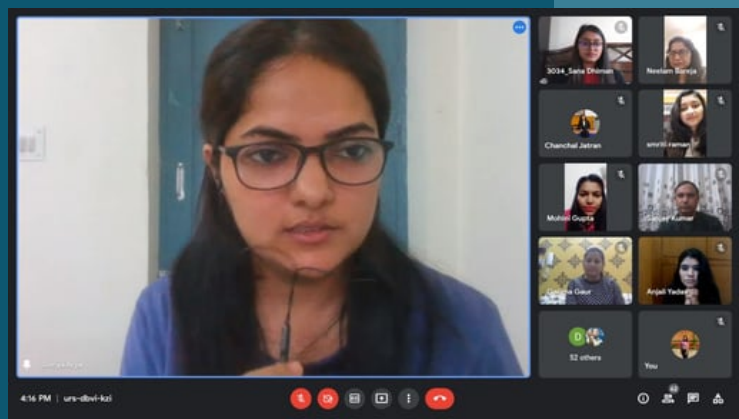
Ten Alumni from 2013 batch to 2021 batch from different sectors graced the occasion & shared their experiences to help others to shape their future. Our TIC Ms Neelam Bareja showered the blessings on all the students and everyone remembered the special bond they shared as mentors and students. Our society convenor Dr. Prempal Singh addressed everyone. All the alumni shared their memories and experiences and what they are doing currently with much enthusiasm. At last, a vote of thanks was proposed by Dr. Abhishek and Ms. Garima for all the student coordinators, alumni for having such a great time.
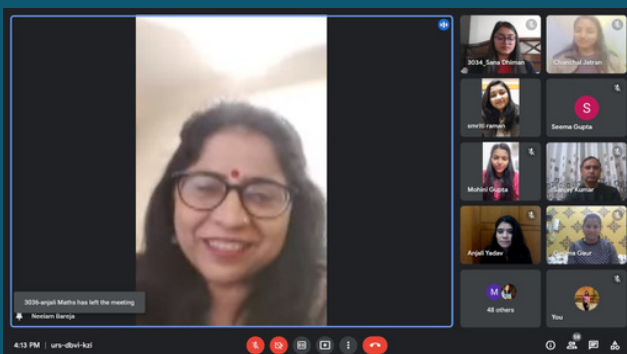
Memories
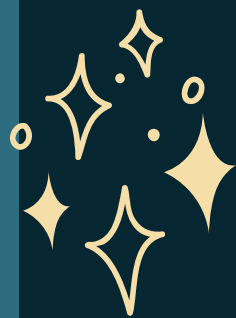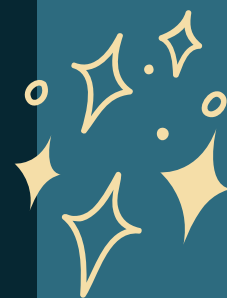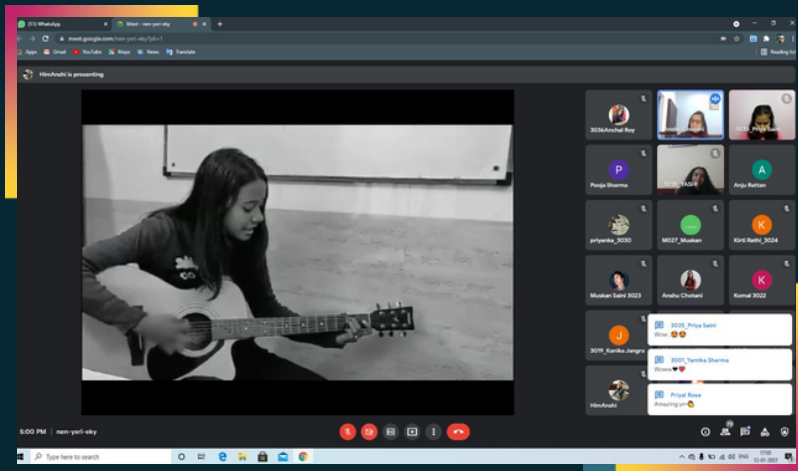
Projects 2021-22

By Dr. Prempal Singh

Project: 1

Faculty Research Project: Institution of Eminence- University of Delhi

Title of the Project: Developing Mathematical Kits to Visulaise Undergraduate Mathematics

Principal Investigators:

Prof. Shobha Bagai, Department of Mathematics, CIC- University of Delhi

Dr. Prempal Singh, Department of Mathematics, Kalindi College

Project: 2

Undergraduate Interdisciplinary Research Project: Kalindi College, University of Delhi

Title of the Project: History of Indian Monuments and Scientific Infrastructure

Principal Investigators:

Prof. Punita Verma, Professor, Department of Physics, Kalindi College, University of Delhi

Dr. Rini Pundir, Associate Professor, Department of History, Kalindi College, University of Delhi

Dr. Prempal Singh, Assistant Professor, Department of Mathematics, Kalindi College, University of Delhi

Student Investigators:

Upagya Chaturvedi, Annu, Yamika, Aayushi Singh, Nisha Rani Rathi. (B.Sc. (Maths) III year).

Devdatta Maitra, Saloni Sharma, Hifza Parveen, Chancha Goyal. (B.Sc. (History) III year).

Shivani Ambesh, Mansi Mann. (B.Sc. (Physics) III year)

Project: 3

Undergraduate Departmental Research Project: Kalindi College, University of Delhi

Title of the Project: "Mathematical Modelling of COVID- 19 Spreading with Asymptomatic Infected and Interacting Peoples in India: Future Behavior and Sensitivity Analysis."

Principal Investigator:

Dr. Jyoti Bhola, Associate Professor, Department of Mathematics, Hansraj College

Dr. Prempal Singh, Assistant Professor, Department of Mathematics, Kalindi College

Student Investigators:

Neeru, Gunjan, Tanu Jha, Anushka Adarsh, Anjali Singh, Sana Dhiman, Yashi Yadav, Aysha Nadeem, Riya Pandey, Eesha, Chaitika Bhatnagar, Anshika Panwar (B.Sc. (Mathematics) II year)

Projects 2021-22

By Dr. Abhishek Kumar Singh

Title of the Project: Vedic Mathematics in Modern Era

Principal Investigators:

Prof. Punita Verma, Professor, Department of Physics, Kalindi College

Dr. Abhishek Kumar Singh, Assistant Professor, Department of Mathematics, Kalindi College

Student Investigators:

Suman, Garvita, Nisha Rani Rathi, Manshi, Upagya Chaturvedi, Sanjana, Himanshi

(B.Sc. (Maths) III year).

Tanisha, Dimple Sharma. (B.Sc. (Physics) III year).

Chavi, Juhi Sahni. (B. Sc. (PS)-II year).

Shivani Rana, Himanshi. (B.Sc. (Physics) II year).

By Dr. Indarpal Singh, Mr. Sanjay Kumar

Title of the Project: Marketing Research and Management

Student Investigators:

Anjali, Muskan.

B.Sc. (Maths) III year).

Mitanshi, Hina, Beena Yadav, Shruti, Manvi Khushi, Prachi, Ekta Pandey

(B. Sc. (PS)-II year).