

# Annual Reports of 2022 - 23

# LECTURE ON NUMBER THEORY

## BY DR. C. S. RAJAN

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## Introduction

The Harish Chandra Mathematical Society, the departmental society of the mathematics department at Deen Dayal Upadhyaya College, University of Delhi, organized a lecture on Dr. C. S. Rajan, Ashoka University's professor of mathematics, entitled "Lagrange's Work on Representations of Integers by Quadratic Forms."

## About our speaker

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At Ashoka University, C. S. Rajan is a professor of mathematics. He enrolled in IIT Kanpur in 1980, marking the beginning of his adventure and the growth of his love for mathematics. He made the decision to dedicate his career to mathematics. He claims that the field with the highest job opportunities is mathematics.

## The Lecture

At 11:30, Dr. C. S. Rajan, our guest, arrived and was cordially welcomed. Dr. Sudha Arora, the teacher in charge, presented the welcome speech and informed the audience about our guest's accomplishments. Dr. Ratnesh R. Saxena then gave the man a souvenir. He gave a brief introduction after his welcome before beginning his talk. After introducing himself, he spoke to the class on the significance of mathematics in daily life. He described his journey toward developing an interest in mathematics for the audience. He even pointed out that in order to make progress we need to make mistakes. He then began to discuss Fermat's Theory of the Number System as he began his presentation on number theory.

As he introduced his subject, he informed us that Fermat had found a remarkable truth regarding prime numbers that can be expressed as the sum of the squares of two numbers. He added that the residual can be expressed as the sum of squares of the integers if the prime number, when divided by 4, leaves 1 as the result. The expressions for 2 and 5 are  $1^2 + 2^2$  and  $1^2 + 2^2$ , respectively. Other prime numbers can be expressed in a similar fashion.



He next spoke about Brahmagupta's equation, which is  $(x^2 + y^2)(u^2 + v^2) = (xu \pm yv)^2 + (xv \mp yu)^2$ . We must concentrate on the total of the divisors in order to calculate the square of two numbers. The numbers that cannot be represented in this way are 3, 7, 11, 19, 23, 31, 43, 47, 59, 67, and 71. He gave examples of several prime numbers

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that can be written as the square of two numbers, which were 2, 5, 13, 17, 29, 37, 41, 53, 61, 73, and 89.

Dr. Rajan instructed the pupils to look for a pattern in the samples given above. The students enthusiastically engaged in the conversation and provided insightful observations. The conversation also included our lecturers. The pattern among prime numbers, which may be written as the sum of the squares of two integers, was then discussed, using Fermat's theorem as support. The numbers that can be stated follow a particular pattern, leaving 1 as the remainder when divided by 4.

It was an excellent conversation between the two as Dr. Sanjay Pant posed a few questions about the subject. He went on to highlight how important vedic math is to us on a daily basis in later portions of the talk. How Vedic mathematics improves our ability to compute. Additionally, he spoke to the youngsters about the history and beauty of mathematics.



He talked about the Baudhayana Theorem, according to which the square of the hypotenuse of a right-angled triangle equals the sum of the squares of the other two sides. In modern times, this is known as the Pythagorean theorem.

He also mentioned Guido Castelnuovo, an Italian mathematician well known for his contributions to algebraic geometry.

As the lecture came to a close, the interactive session with the students started. During this time, the students posed questions and engaged in a lively discussion.

After the talk, Dr. Rajan and the professors had a discussion regarding cryptography.

Dr. Sanjay Pant then gave the visitor a vote of gratitude to finish the session.



# TRIP TO GANDHI SMRITI AND DARSHAN SAMITI

## 29 November '22

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### Introduction

On November 29, 2022, the mathematics department at Deen Dayal Upadhyaya College, University of Delhi, organized a trip to Gandhi Smriti and Darshan Samiti for all of the department's students. All first- and second-year students were invited on the trip as part of a field trip to the memorial and to learn a little bit about Mahatma Gandhi.

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The journey was scheduled to start from Gandhi Smriti and end at Darshan Samiti in the evening. The expedition saw active participation from every student.

## The Trip



All of the students were asked to gather at the campus gate before the journey. The students then boarded the buses belonging to their different departments. The buses headed towards Gandhi Smriti jointly.



Students received some refreshments for refreshment on the bus, and an extensive attendance was taken. Everyone arrived at the memorial on time and disembarked. After that, the pupils were organized into groups and led into the memorial. The guides who would show the groups around were waiting for them when they arrived.

The explanation of Gandhi and the memorial created in his honor was then given by the tour guides. To prevent crowding, the pupils entered the classroom in small groups. Gandhi memorabilia covered the walls as soon as you entered. Each one comes from a certain historical event.



The guides then went into detail about the various photos and gifts. The display included the images, letters, notes, and even the grade papers. Then, the locals gave an explanation of these texts. Almost all of the events that occurred with Gandhi throughout his life are included in them. From his birth,



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upbringing, education, and higher education, from his time in South Africa to his move to India to fight for the nation's freedom.



The letters detailed events from his life, including those from his time in prison, his conversations with many other people, and numerous efforts towards India's freedom. The memorial featured small replicas of the many ashrams that Gandhi stayed in. One of the mementos also included a picture of the well-known "Dandi March."

Gandhi's entire life, from his early years until his sacrifice, was portrayed through a narrative. Together with other items, the car used to transport his remains from Birla House was also on exhibit.

Following the groups' departure from the exhibit, all of the students and their corresponding departmental lecturers gathered for group shots. The pupils were served lunch in the huge dining hall on the property following the group photo and a little break.

Following lunch, the group traveled to the Swachh Bharat exhibition and then continued on to Raj Ghat.



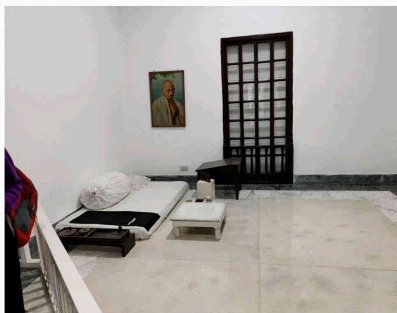
During the excursion to Raj Ghat, the group split apart. According to what their departments had planned, students from each department moved on to the following section. Our department's next stop was Gandhi Darshan at Birla House, where Gandhi stayed for a considerable amount of time while he was in Delhi.



## Gandhi Darshan

The journey continued to Gandhi Darshan at Birla House on Tees January Marg after leaving Gandhi Smriti. The tour guides who would show the pupils around the facility received them when they arrived. After introducing himself, the tour guide continued on to the location of Gandhi's former neighborhood meeting. He was

assassinated at precisely that location.



He then continued the house tour after that. Gandhi's worldly possessions and keepsakes were everywhere throughout the home.



Many of his possessions, including his glasses, silverware, cutlery, clothes, and stick, were on exhibit. The majority of the show was devoted to his ideas and precepts. Everything he



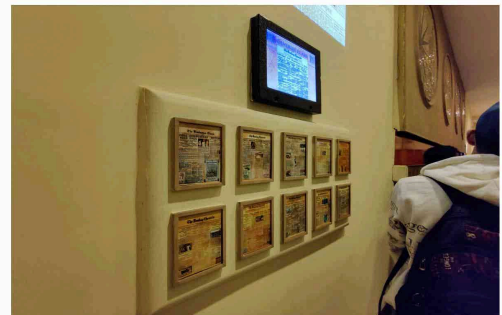
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taught the populace was present in the home. Along with the house, there was a model of the ashram he formerly resided in, with the interior of the house serving as the exterior.



The tour guide briefly went through each of Mahatma Gandhi's teachings before showing a small film about Gandhi's travels. Newspaper clippings displaying the breaking news of India's independence from the British were present.

The kids congregated close to the exit from where they had arrived by bus once the show was over. The tour came to an end after providing the youngsters with refreshments exclusively aboard the buses.



# FRESHERS 22-23

28 January '23

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The Fresher Party 2023 was hosted by the mathematics department at Deen Dayal Upadhyaya College, University of Delhi, on January 28, 2023. The second-year seniors organized the party with equal help from the third-year seniors. Professors from the department attended the freshmen class together with the teacher in charge, Prof. Sudha Arora, Dr. Tarachand, Dr. Rashmi, Mr. Amlendu, and a few more teachers.



The event was held in college room 506. Ritesh and Divya, two second-year students, served as the event's hosts throughout. The freshman was informed of every activity scheduled for the day. The initial step for all first years was a ramp walk, which was followed by their presentation. After that,

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there was a talent hunt, and finally, a dance for all freshmen. Nearly all of the freshmen participated in these enjoyable activities.

The ramp walk began with the girls in all their splendor, followed by the eager boys. The entire audience was supporting the freshman. The event's judges were the teachers in attendance. The talent hunt, the following event, started after the introduction. The first years excitedly awaited the opportunity to showcase their skills in a variety of areas, including dance, singing, music, and poetry. After Mahek gave a dance performance, several more girls gave additional dance performances. The lads contributed as well; Parth sung a song and Jasmehar played the tabla for a couple tunes. Some of the men were performing poems and "Shers."



The teachers enjoyed the performances given by the contestants once the talent quest was over. Following the occasion, there was a couple dance where some first years danced with their friends and some with the seniors. The dance continued after a few couples had formed. Following the dance, the first years were required to respond to a

predetermined question in order to be considered for the titles of Miss and Mr. Fresher.

After a brief intermission during which the answers were examined and the talent hunt performance was taken into account, it was time to declare the winner of the Mr. Fresher contest.

Himanshi, who delivered a lovely song, was named Miss. Fresher, and Jasmehar, who played the tabla on a couple songs, was named Mr. Fresher.



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They received their title badges as well as their teacher-given presents. The group photo was taken after that. After the group picture, the party was over and the students received tickets for refreshments.



Jasmeher was able to obtain a spot and the associated award at the talent hunt event, where Ravi, Jasmeher, Himanshi, Mehek, and Parth later performed in front of the entire campus in the auditorium. The Freshers '23 came to an end after the awards event.





# MATHRIX '23

31st Mar-1st Apr

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## Introduction



The annual departmental fest "MATHRIX," held by the Harish Chandra Mathematical Society at Deen Dayal Upadhyaya College, University of Delhi, took place from March 31 to April 1. Over its duration, MATHRIX featured a variety of activities in which college students and students from other colleges might take part. Several students enthusiastically participated in the events, which included the Auction, Matharon, Sudoku, Entrypto, Quizzel, Tambola, Freaky Finders, and mini games.

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The festival kicked off on March 31 at 10:00 AM with an auction conducted in the college auditorium.

## Auction



The Auction '23 is a yearly celebration of the mathematics department of Deen Dayal Upadhyaya College that is held under the auspices of Mathrix. Shubham from the third year served as the event's coordinator. The college's Auditorium was the designated location. At ten o'clock, the event began. The competition had 20 teams from various institutions, each of which had two to three participants.

The competition included two rounds. The majority of the teams were eliminated in the first round of qualifying, while the surviving teams advanced to the second round. In room 421, the second round was conducted. As the event concluded the winners were announced.



The winners were:

1st prize was ₹3000 which was awarded to Ritik

2nd prize was ₹2000 which was awarded to Jai and Sachin

3rd prize was ₹1000 which was awarded to Prashant, Vinay and Sushant.



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## Matharon



The festival continued with the Matharon, a mathematical relay event, following the auction. The event's coordinator was Fahmi from 3rd year and also assisted by Divya, Abhishek and Harshvardhan. The teacher coordinators for the event were Dr. Tarachand and Mr. Ravi Kumar. There were two rounds, and it was held on college grounds. The programme began at 12:30 PM.

It was the qualifying round in the first round. All competitors must run a 100-meter track in this phase, after which they must answer challenging mathematical questions in groups of eight, one question per round, to advance.

All of the qualified contestants formed four-person teams for the second and final round, which was conducted similarly to a relay race but with a question that needed to be answered before passing the baton could occur. The team that answers the question first wins the round.



A total of 80 persons registered for the event, and 32 individuals or 8 teams advanced to the final round.

The top 3 teams brought the competition to a close.

1st prize of ₹3000 was awarded to Lokesh, Avichal, Harsh, and Animesh

2nd prize of ₹2000 was awarded to Divyanshu, Rajneesh, Abdul and Aanchal

3rd prize of ₹1000 was awarded to Sushant, Rinku, Sachin and Prashant.





## Sudoku



Following the relay competition and a little interval, there was sudoku, which was led by Drivyan and helped by Teesha, both of whom are in their second year. The event took place in room 421 from 1:30 PM.

There were just two rounds, so it was rather straightforward. Everyone who took part in the first round received a unique sudoku puzzle to complete. The sudoku puzzles were all of medium difficulty.

Three contestants were chosen from the first round to go to the second, or final, round, in which they had to solve a sudoku that was incredibly challenging; the first one to do so would win. Almost

60 people participated in sudoku.

Jacc C. Philip took first place in the competition by finishing the sudoku puzzle more quickly than the other two finalists.

He received a ₹1000 prize for taking first place.

## Mini Games



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The festival's major attractions were accompanied by a variety of entertaining side activities. The board games, hoops and a cup, darts, and Rubik's cube were among the minigames. The small games were open to everyone, and winners received candies and chocolates as a prize.

## Encrypto



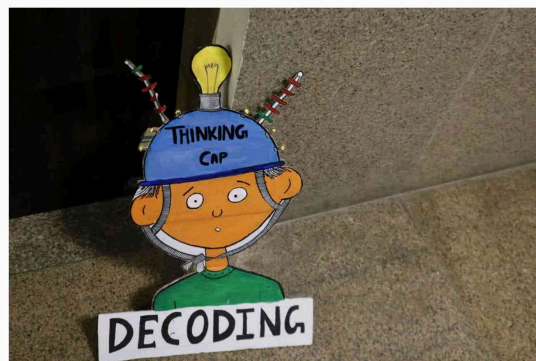
The Sudoku event was followed by the Encrypto event. That happened at roughly 3:30 PM in room 421. Parmita from the third year coordinated the activity with help from Paridhi and Sonika.

The Encrypto competition included four rounds. Participants were asked basic mathematical and logical reasoning-based problems in the first round. In the following round, players answered Bollywood-related questions. The participants had to answer decoding problems in the third and final round. And only those who tied in the third round advanced to the fourth. The fastest person to respond would win. It was a rapid fire round based on deciphering.

Due to the length of the event, there were a few short rounds for the players' amusement, like mini decoding and Origami unfolding.

Out of the 120 people who registered for the event, 20 were chosen for the second round, and a total of 8 people continued to the final round. After the final round, the winners were announced.





₹3000 for the 1st place was awarded to Lokesh, Deen Dayal Upadhyaya College

₹2000 for the 2nd place was awarded to Abhishek and Aditya, Deen Dayal Upadhyaya College

₹1000 for the 3rd place was awarded to Prabhat and Kanishk, Deen Dayal Upadhyaya College

The events of day 1 came to a close with encrypto.

Day 2 of the MATHRIX began on April 1 with the Quizzel quiz contest.

## Quizzel



At 10:00 AM, a quiz competition was held in room 509. Harshit oversaw the event, with Abdul's help, while Prof. Mamta served as the teacher organizer. There were two rounds to the quiz, which was open to students from all departments. The purpose of the quiz was to gauge each participant's general knowledge, comprehension of subject-related material, and mental alertness.

There were about 30 students that took the written test in the first round. Round 1's questions addressed subjects like general aptitude, reasoning, and issues



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linked to the subject (mathematics). There were a total of 8 teams that advanced to the next stage following the judges' evaluation exam.



The second round was a buzzer round in which each team had one minute to respond to as many questions as they could. The topics covered by the questions ranged widely within the scope of graduate-level mathematics. There was a lot of anticipation and stress as the teams were allowed to demonstrate their expertise. The teams with the highest point totals at the conclusion of the

competition received prizes.

1st place was Abhishek and Fahmi, Deen Dayal Upadhyaya College

2nd place was Avichal and Lokesh, Deen Dayal Upadhyaya College

3rd place was Harshul and Davender, Shivaji College





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## Tambola



At noon, a mathematical tambola was held in room 421 following the quiz. Sonika and Prachi assisted Aakriti in leading the event, and Mr. Ratnesh and Mr. Amlendu served as coordinators.

The competition had just one round. The traditional tambola game had a mathematical twist. Participants in this round had to answer the questions that

were given on the screen in order to cross off the numbers on their Tambola ticket. The final winner will be the one who first obtains a full house.



1st position was awarded to Prashant Sahani

2nd position was awarded to Santosh Kumar

3rd position was awarded to Vishal



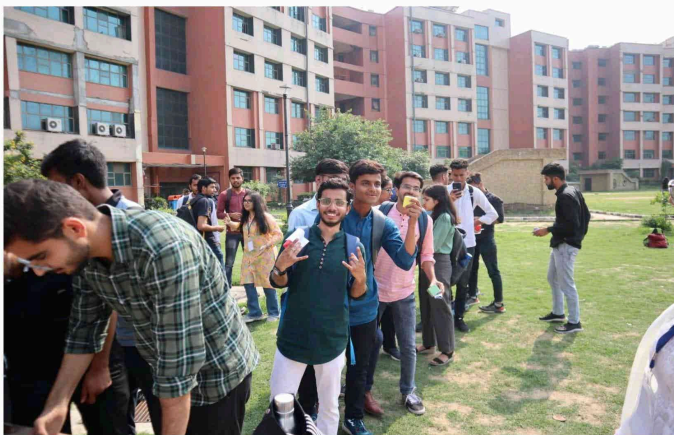
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## Freaky Finders



The MATHRIX's last event was held in room 421 in the evening following the Tambola. The final activity, called Freaky Finders, was a sort of treasure hunt with a mathematical twist. 3 rounds were in it. The event was headed by Agni and Muskan and Khalid were there for assistance.

In round 1, each participant received a clue in the form of a symbol or riddle. In round 2, three-person teams were formed based on a random draw, and each team was assigned a challenging mathematical equation and a logical math problem. and after that, each team was given a puzzle to complete and a cube to locate that was buried. And in the last round, the remaining contestants were handed a map to find particular sites.



Nine finalists were selected from the 30 contestants that advanced to the second round out of the 100 people who registered for the event.

₹3000 for the 1st place was awarded to  
Sachin Yadav

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₹2000 for the 2nd place was awarded to Harish Jyani

₹1000 for the 3rd place was awarded to Tanya



Day 2 of MATHRIX '23 came to a great conclusion with all of the events. Students actively participated in the event, both joining and organizing it, which contributed to its success.







# REPORT

A TALK BY DR. VIKRAMJEET SINGH

CONDUCTED BY HARISH CHANDRA MATHEMATICAL SOCIETY

DEEN DAYAL UPADHAYAY COLLEGE

**JUNE 2, 2023**

On JUNE 2, 2023 a talk on mathematics was given by our esteemed special guest to the students of **DDUC, DU**, pursuing **B.Sc (Hons.) Mathematics** as an **under-graduate course** which was engaging and enlightening. It aimed to inspire and motivate individuals to appreciate and embrace some key principles of higher mathematics.

## ***SPEAKER OF THE SESSION:***

Our honoured guest, **Dr. Vikram Singh Chandel**, is a renowned researcher in the field of Mathematics.

He has been a Postdoctoral Researcher at **IIT Bombay** from Aug 2018 to Dec 2020, then at the **Harish-Chandra Research Institute** from Jan 2021 to April 2022. Since then he is doing a prominent job as an **Assistant Researcher** at **IIT Kanpur**.





### **KEY TOPICS COVERED:**

- 1) CONTINUOUS FUNCTIONS
- 2) WEIERSTRASS THEOREM
- 3) METRIC SPACES

### **FACULTY MEMBERS:**

- |   |   |
|---|---|
| 1. Dr. Sudha Arora<br>Associate Professor     | 2. Mr. Naveen Gupta<br>Guest Teacher              |
| 3. Dr. Mamta Amol Wagh<br>Associate Professor | 4. Dr. Tarachand Parjapati<br>Assistant Professor |



### ***VOLUNTEERS:***

- |                   |                   |
|-------------------|-------------------|
| 1. Paarth Makkar  | 2. Kunal Gangwal  |
| 3. Gaurav         | 4. Vandana Kumari |
| 5. Ishaan Rastogi | 6. Risheta        |



### ***KEY INSIGHTS:***

Event commenced at 2:30 p.m. till 3.30 p.m. Students of **B.Sc (Hons.) Mathematics** attended the UNDER-GRADUATE SEMINAR along with the aforementioned faculty member. The event was conducted in room 509.

### ***CONCLUSION:***

Overall, the event was a great success and a lot of positive reviews were received after the event.

### ***TEACHER-IN-CHARGE:***

Dr. Sudha Arora

(Associate Professor)