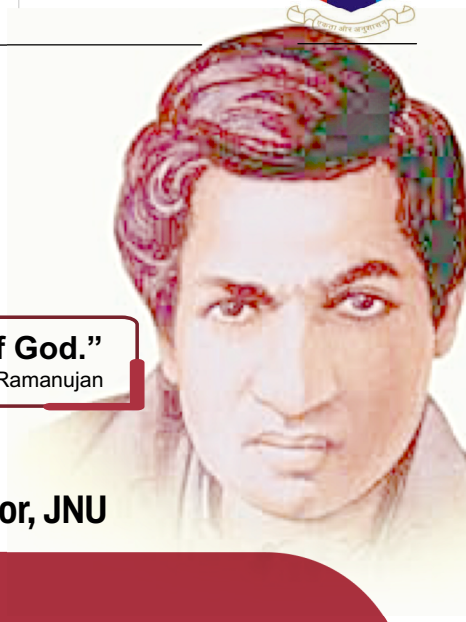
MathSciIntR-Lab
School of Computational & Integrative Sciences
& School of Engineering
Jawaharlal Nehru University | New Delhi

National Mathematics Day

Celebrating the Legacy of **Srinivasa Ramanujan**



> **"An equation means nothing to me unless it expresses a thought of God."**
> — Srinivasa Ramanujan

22nd December 2025 **3:30pm to 5:30pm**

School of Engineering, Seminar Hall, SC&SS Building, Ground Floor, JNU

About **National Mathematics Day**

National Mathematics Day is celebrated every year on 22nd December to commemorate the birth anniversary of the legendary Indian mathematician **Srinivasa Ramanujan**, whose profound contributions continue to inspire generations of mathematicians, scientists, and researchers worldwide.

Theme & Highlights

- Celebrating the beauty, power, and universality of Mathematics
- Exploring the role of Mathematics in science, technology, and society
- Inspiring young minds towards mathematical thinking and innovation

Activities Include

- Invited talks & lectures
- Research presentations
- Interactive sessions & discussions
- Student participation events

Why **Mathematics Matters**

Mathematics forms the foundation of scientific discovery, computational innovation, and interdisciplinary research, driving advancements across natural sciences, engineering, data science, and beyond.

Chief Patron

Prof. **Santishree Dhulipudi Pandit**
Hon'ble Vice Chancellor, JNU.
Colonel Commandant, NCC, JNU

Patron(s)

Prof. **Brajesh Kumar Pandey**, Rector-I,
Prof. **Dipendra Nath Das**, Rector-II
JNU.

Program Chair(s)

Prof. RK Brojen Singh
Dean, SC&IS, JNU

Prof. Pawan Kumar Kulriya
Dean, SOE, JNU

Convener

Dr. Gajendra Pratap Singh
SC&IS, JNU

Co-Convener(s)

Prof. Ram Prasad Prajapati
SPS, JNU

Dr. Ankit Chaudhary
SOE, JNU

Dr. Krishnan Rajkumar
SOE, JNU

Organizing Committee Members

- **Dr. Om Prakash Meena,** SPS, JNU
- **Dr. Rakesh Kumar Meena,** SPS, JNU
- **Tushar Dedha,** SC&IS
- **Shikha Tripathi**, SC&IS
- **Sonal Nigam**, SC&IS
- **Aiswariya Lakshmi CG**, SC&IS
- **Chosching Lazes**, SC&IS
- **Aditya Singh Bains**, SC&IS
- **Shobhit Babu**, SoE
- **Vaibhav Kannojiya**, SoE
- **MD Sarosh Alam**, MSc, SC&IS
- **Priyanshu Raj**, MSc, SC&IS
- **Maitreyee**, MSc, SC&IS
- **Aruneet Binu**, MSc, SC&IS
- **Manu Shukla**, MSc, SC&IS
- **Binsil N Kuriakose**, MSc, SC&IS
- **Khushi**, MSc, SC&IS
- **Nishant Tyagi**, MSc, SC&IS
- **Shreya Singh Yadav**,MSc,SC&IS

& All MathSciIntR-Lab members

MathSciIntR-Lab
School of Computational & Integrative Sciences
& School of Engineering
Jawaharlal Nehru University | New Delhi

Call for Papers & Student Participation – Instructions

Interested students are invited to submit their abstracts for paper presentation at:

vpijnuconference@gmail.com

Registration

https://docs.google.com/forms/d/e/1FAIpQLSfVjyiCl6mkTjTNeShU067877Ok4kErX9Pa8oR8e8AWxQXNiQ/viewform?usp=header

Last date for registration and abstract submission is
December 20, 2025.

Submission Guidelines

- Abstracts should be original and unpublished
- The abstract should not exceed 300 words
- The abstract must clearly mention:
- Title of the paper
- Author(s) name(s)
- Institutional affiliation
- Contact email ID
- Abstracts may be submitted in PDF or Word format
- The subject line of the email should be:
  "Abstract Submission – National Mathematics Day 2025"

Presentation Guidelines

- Selected participants will be informed via email
- Presentation mode: Oral presentation
- Presentation time will be communicated after abstract acceptance
- Participants are requested to adhere strictly to the allotted time

Registration & Certification

- No registration fee
- Registration is mandatory for all participants
- E-certificates will be issued only to registered participants
- Submission of the feedback form after the event is compulsory for certificate issuance

Important Notes

- Participation is open to UG, PG, PhD scholars, and researchers
- Limited presentation slots are available; selection will be based on abstract quality
- The decision of the organizing committee will be final

For Queries & Further Details

Email: **vpijnuconference@gmail.com**

Contact: +91 99101 36414

https://jnu.ac.in/scis

(November backlog series)

1

Monthly Ancient Indian Mathematics Lecture Series-28

Ramanujan, Magic Squares, and Graph Theory

Dr. **Gajendra Pratap Singh**
MathSciIntR-Lab, School of Computational and Integrative Science
Jawaharlal Nehru University
E-mail: gajendra@jnu.ac.in

Abstract:
Srinivasa Ramanujan's work continues to inspire awe for its depth, intuition, and creativity. This paper explores Ramanujan's fascination with patterns in numbers, highlighting his contributions to magic squares, number theory, and graph-theoretic structures. Selected examples of magic squares are examined alongside their connections to graphs, including Latin squares, adjacency relations, and combinatorial designs. This presentation emphasizes Ramanujan's unique ability to uncover hidden structures, symmetries, and numerical elegance, bridging recreational mathematics with deeper theoretical insights. By analyzing these interconnections, the talk demonstrates how Ramanujan's discoveries continue to influence modern mathematical research, illustrating the enduring "magic" of his approach to numbers and graphs.

Keywords:
Ramanujan; Magic squares; Number theory; Graph theory; Combinatorial design; Latin squares; Mathematical patterns; Symmetry

2

The Prisoner's Dilemma in Game Theory

Ms. **Shikha Tripathi**
MathSciIntR-Lab, School of Computational and Integrative Science
Jawaharlal Nehru University
Email: shikha15_sit@jnu.ac.in

Abstract:
The Prisoner's Dilemma is a cornerstone of game theory that illustrates the tension between individual rationality and collective benefit. This paper examines the structure, strategies, and outcomes of the Prisoner's Dilemma, highlighting its relevance in economics, social science, and evolutionary biology. By analyzing classical and iterated versions of the game, we explore how cooperation can emerge despite incentives to defect, and how strategies like tit-for-tat shape long-term outcomes. The presentation emphasizes the implications of the dilemma for understanding human behavior, strategic decision-making, and the development of cooperative norms in competitive environments.

Keywords:
Prisoner's Dilemma; Game theory; Cooperation; Defection; Strategic decision-making; Iterated games; Nash equilibrium

1

Monthly Indian Mathematics Lecture Series-29

An elementary proof of Ramanujan's famous congruences p(5n + 4) ≡ 0 (mod 5) and τ(5n + 5) ≡ 0 (mod 5)

Prof. **Gaurav Bhatnagar**
Ashoka University,
Sonepat Haryana
Email: gaurav.bhatnagar@ashoka.edu.in

Abstract:
Abstract: The recurrence $np(n) = \sum \sigma(i)p(n-i)$, $i=1,2,3,\ldots n$ has been used by Erd˝os and credited to Ford (1931) but appears in Ramanujan's note-books. Here the divisor function $\sigma(n)$ is related to the partition function $p(n)$. We show how Ramanujan could have obtained this result, and show some evidence that this was one of Ramanujan's standard tricks. Using a slight modification of this trick, we obtain an elementary proof of Ramanujan's famous congruences $p(5n + 4) \equiv 0 \pmod 5$ and $\tau(5n + 5) \equiv 0 \pmod 5$. The proof requires no more than what Euler and Jacobi (and Ramanujan) knew. The proof extends to embed the congruences into 4 infinite families of congruences for rational powers of the eta function. Many congruences of this nature have been found by Chan and Wang (2019); seven of their assertions are covered in our list. The result may be number-theoretic in nature, but the technique is part of the combinatorial toolkit involving generating functions.

2

Monthly Ancient Indian Mathematics Lecture Series-29

Mathematical Modelling of Gravitational Instability and Star Formation

Prof. **Ram Prasad Prajapati**
School of Physical Sciences, JNU, New Delhi
Email: rpprajapati@mail.jnu.ac.in

Abstract:
Star formation is a fundamentally multiscale and nonlinear process, and its theoretical understanding relies crucially on mathematical modelling of self-gravitating fluids. This talk focuses on the mathematical framework that underpins our current understanding of the onset of star formation, emphasizing the role of basic dynamical equations and their analytical treatment. Starting from the equation of motion for a gravitating fluid, coupled self-consistently with the Poisson equation for the gravitational potential and the continuity equation for mass conservation, we construct a closed set of governing equations that describe astrophysical media, such as molecular clouds. The central part of the discussion focuses on linear perturbation theory and normal mode analysis. By introducing small-amplitude perturbations about a homogeneous equilibrium state and decomposing them into Fourier modes, the governing equations are reduced to an eigenvalue problem. This procedure naturally leads to the dispersion relation, which encapsulates the competition between pressure support and self-gravity. The mathematical structure of the dispersion relation enables the identification of unstable modes and defines critical scales, such as the Jeans length and Jeans mass, which determine the characteristic size and mass of collapsing regions. The outcomes of the mathematical modelling may be discussed in a wide range of astrophysical systems, such as molecular clouds, nebulae, galaxy clusters, circumstellar disks, etc.

3

On the Distribution of Points of Valuation 1 for a Polynomial in Two Variables

Dr. **Krishnan Rajkumar**
School of Engineering
Jawaharlal Nehru University, New Delhi
Email: krishnan@mail.jnu.ac.in

Abstract:
We investigate the variation in the total number of points in a random $p \times p$ square in $Z2$ at which the p-adic valuation of a given polynomial in two variables is greater than 1. We establish that this quantity follows a Poisson distribution as $p \longrightarrow \infty$ under a certain conjecture. We also relate this conjecture to certain uniform distribution properties of a vector valued sequence.

4

यजुर्वेद में गणित

Dr. **Krishna Mohan Pandey**
SSIS, JNU, New Delhi
Email: kmpandey@mail.jnu.ac.in