

**DEPARTMENT OF MATHEMATICS, FACULTY OF MATHEMATICAL SCIENCES  
UNIVERSITY OF DELHI, DELHI**

**98<sup>th</sup> ANNUAL REPORT APRIL 01, 2020 –MARCH 31, 2021**

**Major Activities and Achievements**

The Department of Mathematics at the University of Delhi was established in 1947 and ever since its inception, department has worked towards becoming a center of excellence for advanced research in various areas of Mathematics including Algebra, Analysis, Topology, Differential Equations, Mathematical Programming. A strong commitment of the department to excellence in teaching and research along with a practical approach towards education has attracted talented students from all over the country. The Department offers M.A./M.Sc. and M.Phil./Ph.D. programs in Mathematics. It is dedicated to providing the students with the environment and the infrastructure that helps them develop the potential for scholarship, creative work, professional realization, and service. Department has been receiving various support and grants including UGC's SAP-DRS, SAP-DSA, DST-FIST and DST-PURSE. The Department is ranked 10<sup>th</sup> in QS World University Ranking in India in 2021.

**Honours/Distinctions**

Ruchi Das is an editorial board member of Asian -European Journal of Mathematics, World Scientific.

Tarun Das served as an expert in selection committees to appoint permanent faculties outside University of Delhi domain.

Ajay Kumar joined the department as a NASI (The National Academy of Sciences, India) Senior Scientist Platinum Jubilee Fellow, after his retirement.

Lalit Kumar is a member of editorial board of International Journal of Wavelets Multiresolution and Information Processing (IJWMIP). Publisher: World Scientific, Singapore.

Lalit Kumar is a member of editorial board of Mathematical Journal of Interdisciplinary Sciences. Publisher: Chitkara University, Punjab.

C.S. Lalitha is University Representative on the Governing Body of Shaheed Bhagat Singh college w.e.f. March 27, 2020.

Pratima Rai is a member of Advisory committee of the Vintage: Journal of Thematic Analysis.

Sachi Srivastava was awarded INSA Teachers Award 2020.

**Publications**

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Thakur, R. & Das, R. (2020). Transitivity and sensitivity of iterated function systems via Furstenberg families, *Aequationes Mathematicae*, 94 (6), 1123-1140.

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### Research Projects

Sl. No.	Project Title	Year/ Period	Funding Agency	Amount sanctioned (yearly basis)
1	“On Some Ring Extensions”- Atul	2019-21	DST-SERB (MATRICS	Rs 2,20,000/-

	Gaur		Scheme)	
2	“A Study of Center and Closed Lie Ideals of Vector-Valued Beurling Algebras”- Ranjana Jain	2020-21	Faculty Research Programme Grant-IOE, University of Delhi	Rs. 1,75,000/-
3	“Discrete Gabor Frames and Their Applications”- Lalit Kumar	2020-21	Faculty Research Programme Grant-IOE, University of Delhi	Rs. 1,75,000/-
4	“Scalarization Aspects in Vector and Set Optimization”- C. S. Lalitha	2018-21	DST-SERB (MATRICS Scheme)	Rs 2,20,000/-
5	“First and Second Order Constraint Qualifications in Scalar and Vector Optimization”- C. S. Lalitha	2020-21	Faculty Research Programme Grant-IOE, University of Delhi	Rs. 1,75,000/-
6	“Finite Group Actions on Product of Spaces of Type (0,0) and Borsuk-Ulam Type Theorem for Product of Projective Spaces”- H. K. Singh	2018-21	DST-SERB (MATRICS Scheme)	Rs 2,20,000/-
7	“Index of Finitistic Spaces and Transformation Groups on Projective Space”- H. K. Singh	2018-21	DST-SERB (EMR Scheme)	Rs 5,83,990/-
8	“Study of the dynamics of exact solutions for the nonlinear evolution equations using Lie symmetry analysis”- Sachin Kumar	2020-23	DST-SERB (EEQ Scheme)	Rs 6,91,553/-
9	“Lie Symmetry Analysis and Dynamics of Physical Phenomena for Nonlinear Evolution Equations”- Sachin Kumar	2020-23	DST-SERB (MATRICS Scheme)	Rs 2,20,000/-
10	“Existence of a solution and controllability of functional differential systems”- Surendra Kumar	2020-21	Faculty Research Programme Grant-IOE, University of Delhi	Rs. 1,75,000/-
11	“Weighted Composition Operators that are close to an Isometry”- Sachi Srivastava	2020-21	Faculty Research Programme Grant-IOE, University of Delhi	Rs. 1,75,000/-
12	“Quantum Dynamical Semigroups and Perturbations”- Sachi Srivastava	2020-23	DST-SERB (MATRICS Scheme)	Rs 2,20,000/-
13	“Asymptotics of Solutions of Linear and Non-Linear Delay Differential Equations”-Sachi Srivastava	2020-23	SERB Core Research Grant	Rs. 10,59,468/-

### Seminars and Colloquia Organized

Department of Mathematics organized an online Research Scholar seminar for M.Phil. Students on September 28, 2020. (Organizer: Atul Gaur)

### Seminar/Conference Presentations

Ruchi Das delivered a plenary talk on “Broadening Horizons of Transitivity and The Butterfly Effect in Dynamical Systems” at the Annual Conference of Indian Women and Mathematicians during March 27-28, 2021.

Ruchi Das delivered an invited talk on “Contributions from Indian Mathematicians at a glance” at the National Mathematics Day, H.P. University, Shimla on December 22, 2020.

Tarun Das delivered invited talk entitled “Sightseeing Stability in Pointwise Dynamics” at International Conference on Recent Trends in Mathematics, Math Vision 2020 Project, CNU, Korea on August 13, 2020.

Tarun Das delivered two Lectures entitled “Sub-shifts of finite type” and “Transitivity leading to Smale’s Theorem” in the Refresher course on Mathematics at the Department of Mathematics, Jammu University on 4<sup>th</sup> and 5<sup>th</sup> January 2021.

Atul Gaur presented a paper entitled “Finite ring with  $n$  zero divisors” in the first National conference on “Applications on Mathematical Tools in Social Science and Sciences (Online)” held at Zakir Hussain college, University of Delhi during on October 17-18, 2020.

C. S. Lalitha delivered a lecture on “Existence Theorems and Optimality Conditions for Minimization Problems”, in the Refresher Course in Mathematics, Teaching Learning Centre, Ramanujan College, University of Delhi, on March 27, 2021.

C. S Lalitha delivered a lecture on “Introduction to Variational Inequalities”, in the Workshop on Nonlinear Optimization, Variational Inequalities and Artificial Intelligence, Manav Rachna University, on March 21, 2021.

C. S. Lalitha gave a talk on External and Internal Stability in Set Optimization, International Webinar on Advances in Operational Research for Optimal Humanosphere: 20-22, November, 2020 jointly organized by ORSI Tirupati Chapter, Indian Society for Probability and Statistics (ISPS) and S.V. University, Tirupati.

C. S. Lalitha delivered a talk on Contributions of Mathematics to Sciences and Social Sciences National Conference on Applications of Mathematical Tools in Social Sciences and Sciences, Zakir Husain Delhi College, University of Delhi, October 17-8, 2020.

C. S. Lalitha delivered lecture on Convex Optimization and Applications during The Digital International Conference on Applied Mathematical Sciences (DICAMS-2020) jointly organized by Department of Applied Sciences, Parul University, Vadodara and The Department of Mathematics, Gujarat university, Ahmedabad held on September 26-27, 2020.

Pratima Rai delivered an invited talk on “Numerical Analysis of a class of singularly perturbed parabolic turning point problem with time delay” at “International Conference on Integrated Interdisciplinary Innovations in Engineering (ICIII-2020) from August 28-30, 2020 organized by University Institute of Engineering and Technology, Panjab University, Chandigarh under TEQIP-III.

Pratima Rai delivered an invited talk on “Scientific Research and Various Research Tools” at “Online National Level two day workshop on Research Methodology” held at Department of Mathematics, Goswami Ganesh Dutt Sanatan Dharam College, Haryana, Hoshiarpur, Punjab from 9-10<sup>th</sup> October, 2020.

Sachi Srivastava delivered a talk on “Delay Semigroups and Stability” on occasion “Luma Day on Differential Equations and Semigroups” at the Universidad de Zaragoza (Spain) on February 1, 2021.

Sachi Srivastava delivered a talk on “Delay Semigroups and Polynomial Stability” at the Department Seminar, University of Newcastle on February 15, 2021.

### **Other Inter-Institutional Collaboration**

Ruchi Das collaborated with Sejal Shah, Department of Mathematics, Faculty of Science, The M.S. University of Baroda, Vadodara.

Ruchi Das collaborated with Xinxing Wu, School of Mathematics and Statistics, Guizhou University of Finance and Economics, Guiyang, P. R. China

Atul Gaur collaborated with Hai Q. Dinh, Kent State University, USA.

Atul Gaur collaborated with Abhay Kumar Singh Indian Institute of Technology (ISM) Dhanbad

Ranjana Jain collaborated with Purnima Gupta, Department of Mathematics, Sri Venkateswara College, University of Delhi, Delhi.

Ajay Kumar collaborated with V Ravichandran, Department of Mathematics National Institute of Technology, Tiruchirappalli, Tamil Nadu, India.

Sachin Kumar collaborated with Behzad Ghanbari, Department of Basic Science, Kermanshah University of Technology, Kermanshah, Iran.

Sachin Kumar collaborated with Dumitru Baleanu, Institute of Space Sciences, Magurele-Bucharest, Romania.

Arvind Patel collaborated with Shobha Bagai, CIC, University of Delhi, Delhi.

Sachi Srivastava collaborated with Prof. Ralph Chill, TU Dresden, Dresden, Germany.

Sachi Srivastava collaborated with W. Arendt, Institute of Applied Analysis, University of Ulm, Ulm, Germany.

Sachi Srivastava collaborated with I. CHALENDAR Université Paris-Est, Marne-la-Vallée, France.

Sachi Srivastava collaborated with Prof. Franco Fagnola, Politecnico di Milano, Milan, Italy.

Sachi Srivastava collaborated with Prof. K. B. Sinha, JNCASR, Bangalore, India.

### **Placement Details (Number and percentage of students placed)**

The department handles all aspects of placements of the students through its placement cell Ananya - the Placement Cell. The cell serves to act as an interface between the industry and the students. Ananya - the Placement Cell assures logistic support to the visiting companies at every stage of the placement process; right from arranging for tests, pre-placement talks and conducting final interviews. The placement cell also inculcates within students the ability to handle stress, pressure and tackle all emotional ambiguities through conducting workshops, interactive sessions with professionally trained people. The aim is to prepare our students to face real world challenges.

Total 27 (21 from Current batch & 6 from Old Batch) students were placed out of 108 students registered with the placement cell. Total 26 companies visited us (online). The average CTC offered to the students was 6.01 lakhs per annum while the highest CTC offered was 14.8 lakhs per annum.

### **Extension and Outreach Activities**

Tarun Das is the Treasurer of the Indian Society for History of Mathematics.

Tarun Das delivered invited talk during Workshop on Analysis conducted by Department of Mathematics, Hindu College held on March 2, 2021.

Ranjana Jain delivered an invited talk entitled "Linear algebra behind the web search" in the Webinar "Trisectrix" at the Sri Venkateswara College, University of Delhi on January 28, 2021.

Ajay Kumar delivered two invited lectures on "Continuity and Uniform continuity" and "Introduction to Fourier Analysis", Jammu University during January 7 and January 12, 2021.

Ajay Kumar delivered two invited lectures on "Continuity and Uniform continuity" and "Introduction to Fourier Analysis", Panjab University. Jan.19 and Jan. 20, 2021.

Surendra Kumar attended Refresher Course in Mathematics organized by Teaching Learning Centre, Ramanujan College, University of Delhi, during March 16-30, 2021.

C. S. Lalitha chaired the valedictory session at 53rd Annual Convention of the Operational Research Society of India and International Webinar "Role of Operations Research during Pandemic" in association with Operational Research Society of Nepal on December 20, 2020.

Pratima Rai participated in two week refresher course on "Sciences of Yoga and Meditation" organized by Center for Professional Development in Higher Education, HRDC, University of Delhi, from June 17-30, 2020.

Pratima Rai participated in online Faculty Development Programme on "Technology and Instructional Reforms with reference to Online Teaching, Learning & Evaluation" organized by "Centre for Academic Leadership and Education Management (CALEM), Panjab University, Chandigarh" from July 15-20, 2020.

Pratima Rai participated in online Faculty Development Programme on "E-content Generation and Managing Online Teaching" organized by "Aurbindo College (E), University of Delhi, in collaboration with Mahatma Hansraj, faculty Development Centre, Hansraj College, University of Delhi", from 11<sup>th</sup>-17<sup>th</sup> December, 2020.

H. K. Singh participated in online Refresher Course on Mathematics/ Operational Research/ Statistics and Computer Science on the theme 'From Zero to Infinity: A Journey of Knowledge' held at the Centre for Professional development in Higher Education, University of Delhi, Delhi from December 2-15, 2020.

Sachi Srivastava is serving as the Executive Committee, Indian Women and Mathematics (initiative of NBHM).

**Number of M.Phil./Ph.D. Awarded**

Ph.D.	-	15
M.Phil.	-	05

**Faculty strength**

Permanent Faculty	-	20
NBHM Visiting Professor-		01
Guest Faculty	-	15

**Post Doctoral Student** - 01

**Prof. Ruchi Das**