

# MATHNEWS

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An e-Newsletter from the Department of Mathematics, CUTN

Editors: Dr. T. Kavaskar and Dr. S.V. Bharanedhar

## Vision

To be an internationally acclaimed Department of Mathematics for its teaching and research that also caters to the educational and occupational needs of the local community.

## Mission

To provide a world class teaching and research infrastructure.

To promote professional working environment that supports innovative thinking and teamwork.

To inculcate the art of asking questions, formulating the problem, solving the problem and interpreting the solution for possible applications.

## About the Department

This department was started in the year 2010 with fiveyear integrated M.Sc., Programme in Mathematics and of which, four batches have passed out. Department of Mathematics strives to be a premier educational and research facility in India focusing on innovative teaching, abstraction, application and interdisciplinary research in Mathematics. The department promotes professional working environment that supports risk taking, innovative ideas and team work. At present we have 9 regular faculty members against the 10 sanctioned positions. We offer five-year integrated Masters programme in Mathematics, M. Phil in Mathematics and PhD program in Mathematics. The curriculum for I. M.Sc. programme was designed in consultation with top Mathematicians of this country that includes essential abstract and applied topics of Mathematics. We prescribe project work for I. M.Sc. students for motivating them to do research in Mathematics. The first batch of PhD students joined the department in August 2015.

The thrust areas of research in our department include Functional Analysis, Numerical Analysis, Algebra, Linear Algebra, Optimization and Operations Research, Data Mining & Analytics, Computational/Numerical Algorithms, Partial Differential Equations, Integral Equations, Harmonic Analysis, Integral Transforms, Fluid Dynamics, Graph Theory, Complex Analysis and Topology.

*Faculty Members and their areas of interest*

	<p><b>Dr. R. ROOPKUMAR</b></p> <p><b>Professor and Head</b></p> <p>Integral Transforms and Generalized functions.</p>		<p><b>Prof. T. SENGADIR</b></p> <p><b>Professor</b></p> <p>Functional Analysis, PDE and PDE with delays.</p>
	<p><b>Dr. V. RENUKA DEVI</b></p> <p><b>Associate Professor</b></p> <p>General Topology - Ideal topological space, Volterra space, statistical convergence; Generalized topological space, Soft sets.</p>		<p><b>Dr. A. CHANDRASHEKARAN</b></p> <p><b>Assistant Professor</b></p> <p>Linear Algebra, Game Theory and Linear Complimentarity problems.</p>
	<p><b>Dr. RAMESH VENKADACHALAM PALANI</b></p> <p><b>Assistant Professor</b></p> <p>Algorithms &amp; Complexity theory, Number Theory, Big Data Analytics and Pedagogy.</p>		<p><b>Dr. N. BARANI BALAN</b></p> <p><b>Assistant Professor</b></p> <p>Inverse Problems, Optimal Control and Partial Differential Equations.</p>
	<p><b>Dr. VIRENDRA KUMAR</b></p> <p><b>Assistant Professor</b></p> <p>Fluid Mechanics, Flow through Porous Media, Bio-convection and Perturbation Techniques.</p>		<p><b>Dr. T. KAVASKAR</b></p> <p><b>Assistant Professor</b></p> <p>Graph Theory and Algebraic Combinatorics.</p>
	<p><b>Dr. S. V. BHARANEDHAR</b></p> <p><b>Assistant Professor</b></p> <p>Harmonic mappings, Graph Theory and Complex Analysis.</p>		

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## *Achievements and Invited talks/presentations by faculty members*

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### **The following are the talks/presentations delivered by Dr. T. Sengadir**

1. Delivered an invited talk (2 sessions) on “Semigroup and its applications to Delay Diffiecntial equation” at Refresher Course, Madurai Kamaraj University on 11.12.2020.

### **The following are the talks/presentations delivered by Dr. R. Rookumar**

1. Delivered a talk on "Lagrangian multiplier method for constrained optimization problem", Online workshop on Mathematical Analysis, Department of Mathematics, Loyala College, Chennai, on 11.06.2020.
2. Delivered a talk on "Linear spaces and linear transforms", Refresher Course on Mathematics and Statistics, Department of Statistics, University of Madras on 13.10.2020.
3. Delivered a talk on "Abstract measure theory", Refresher Course on Mathematics and Statistics, Bharathiar University, Coimbatore on 27.11.2020.
4. Delivered a talk on "Complex integration", Refresher Course on Mathematics and Statistics, Bharathidasan University, Trichy on 01.12.2020.
5. Delivered a talk on "Complex integration", Refresher Course on Mathematics and Statistics, Bharathidasan University, Trichy on 02.12.2020.
6. Delivered a talk on "Residue calculus", Refresher Course on Mathematics, School of Mathematics, Madurai Kamaraj University, Madurai on 19.12.2020.
7. Delivered a talk on "Limits and continuity", Two-day National Webinar on Real Analysis, Department of Mathematics, Maris Stella College, Vijayawada on 20.02.2021.
8. Delivered a talk on "Limits and continuity", Two-day National Webinar on Real Analysis, Maris Stella College, Vijayawada on 20.02.2021.
9. Delivered a talk on “Applications of quaternions in image processing”, International Conference on Mathematical modelling and computational intelligence techniques, Department of Mathematics, The Gandigram Rural Institute, Gandigram on 11.02.2021.
10. Presented a paper entitled “One-dimensional Quaternionic Special Affine Fourier Transform”, 12th International Conference on Clifford Algebras and Their Applications in Mathematical Physics, University of Science and Technology of China, Hefei, China from 03.08.202 to 07.08.2020.

### **The following are the talks/presentations delivered by Dr. V Renuka Devi**

1. Delivered an invited talk on “Volterra Space” at Government Arts College for Women, Sivaganga on 25.08.2020.
2. Presented a paper entitle “Generalized hyperconnected Spaces” in the 26<sup>th</sup> International Conference of International Academy of Physical Sciences at Guru Ghasidas Unievrstiy, Bilaspur from 18.12.2020 to 20.12.2020.
3. Delivered an invited talk on “Taxicab Geometry” at Rajapalayam Rajus’ college, Rajapalayam on 27.02.2021.
4. Delivered an invited talk on “Geometry and Topology” TEQIP - III Sponsored Two day online FDP on Scientific Research on Topology organized bythe Department of Mathematics, Coimbatore Institute of Technology, Coimbatore on 22-03-2021.

5. Delivered an invited talk on “Volume of n-dimensional sphere” Webinar Series on Capacity Building programme for Women Students of Mathematics organized by the Department of Mathematics, Sri GVG Visalakshi College For Women, Udumalpet held on 02.06.2021.
6. Delivered an invited talk on “Recent trends on soft sets” at Faculty Development Programme organized by the Department of Mathematics, Rabiammal Ahamed Maideen College for Women, Thiruvarur held on 12.06.2021.

**The following are the talks/presentations delivered by Dr A.Chandrashekar**

1. Delivered a series of lectures in Online Foundation course in Mathematics, MTTS trust at K.C. College Madurai from 4.10.2020 to 24.10.2020.
2. Delivered a talk on “Foundations of Mathematics” in the department of Education, CUTN on 17.11.2020.
3. Delivered a series of lectures on “Polynomial and Field extensions” through online, MTTS from 21.03.2021 to 07.03.2021.
4. Delivered a few lectures on “Linear Complementarity Problems” organized by IIT Indore from 25.03.2021 to 27.03.2021.

**The following are the talks/presentations delivered by Dr N. Barani Balan**

1. Delivered a talk on “Inverse and optimization Problems” at the International Faculty Development Programme on "Astute-Efflux Trends in Mathematics", SNS College of Engineering, Coimbatore from 02.07.2020 to 07.07.2020.
2. Delivered a talk on “Well posed Problem: An Overview” at A Live Webinar on Applied Mathematics, Anna University, Tiruchirappalli on 15.07.2020.
3. Delivered a talk on “Mathematical Modelling” at Two days webinar on "Mathematical Modelling and Problem-solving using SageMath", Venkateswara College of Engineering, Sriperumpudur, on 04.08.2020.
4. Delivered a talk on “Mathematical Models in Biology” at the Two days International webinar on Mathematical and Computational Biology, Department of Mathematics, RVS College of Arts and Science, Coimbatore, on 24.11.2020.
5. Delivered a talk on “Diffuse Interface Model of Multi-species Tumor Growth”, at the National Conference on Mathematical Theory of Control (NCMTC 2020), National Institute of Technology Puducherry, Karaikal, from 10.12.2020 to 12.12.2020.
6. Delivered a talk on "Mathematical Modeling and inverse problems" through online in "TEQIP-III" at Coimbatore Institute of Technology on 12.03.2021.

**The following are the talks/presentations delivered by Dr T. Kavaskar**

1. Delivered a special talk in the eve of 133<sup>rd</sup> birth anniversary of Srinivasa Ramanujan, at Kongu Arts and Science College, Erode on 22.12.2020.
2. Delivered an invited talk on “Applications of Sylow’s Theory” A.D.M. College for Women, Nagapattinam on 01.03.2021.
3. Delivered an invited talk (2 sessions) on “Graph Theory” Virtual Refresher programme on Applied Mathematics on 19.03.2021.

**The following are the talks/presentations delivered by Dr S.V. Bharanedhar**

1. Delivered a talk in the Webinar on Career Guidance for higher studies in Mathematics, on 22.02.2021 at Vivekananda College, Madurai.

## *Publications*

<b>Title of paper</b>	<b>Name of the author/s</b>	<b>Name of journal</b>	<b>Year of publication</b>
The Lambert transform over distributions of compact support, L1-functions and Boehmian spaces	B. J. Gonzalez, E. R. Nerin and R. Roopkumar	Annals of Functional Analysis	2020
A Characterization of Nonnegativity relativis to Proper Cones	Chandrashekar A, Sachindranath J and Vatsalkumar N Mer	Indian J. Pure Appl. Math.	2020
A Necessary and Sufficient Condition For 2 To be Primitive Root of $2P+1$	V. P. Ramesh, R. Thangadurai, M. Makeswari and Saswati Sinha	The Mathematics Student	2020
A Uniformly Convergent Numerical Algorithm on Harmonic (H(I) Mesh for Parabolic Singularly Perturbed Convection-Diffusion Problems with Boundary Layer	Gajendra Babu, M. Prithvi, Kapil K. Sharma and V. P. Ramesh	Differential Equations and Dynamical Systems	2020
Analyzing Lotka Volterra Reaction-Diffusion Model Using Optimization Technique	K. Navaneetha Krishnan, S. Hemalatha, L. Shangeranesh and N. Barani Balan	Indian Journal of Industrial and Applied Mathematics	2020
Inverse source problems for a generalized korteweg-de Vries equation	A. Arivazhagan, K. Sakthivel and N. Barani Balan	J. Inverse III-Posed Probl.	2020
On the extension of the coupled fractional Fourier transform and its properties	R. Kamalakkannan, R. Roopkumar and A. Zayed	Integral Transforms and Special Functions	2021
Quaternionic short-time fractional Fourier transform	R. Roopkumar	Int. J. Appl. Comput. Math	2021
Short Time Coupled Fractional Fourier Transform and The Uncertainty Principle	R. Kamalakkannan, R. Roopkumar and A. Zayed	Fractional Calculus & Applied Analysis	2021
Stronger Forms of Sensitivity in the Dynamical System of Abelian Semigroup Actions	V. Renukadevi and S. Tamilselvi	Journal of Dynamical and Control Systems	2021
A Uniformly convergent upwind scheme on harmonic mesh for singularly perturbed turning point problems	V. P. Ramesh, Kapil K. Sharma, B. Priyanga and G. Narayani	International Journal for Computational Methods in Engineering science and Mechanics	2021
An Over stability analysis of Vertically vibrated suspension of active swimmers subjected to thermal stratification	Virendra Kumar and K. Srikanth	S N Applied Science	2021

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*Book Chapter*

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Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Name of the conference	National / International	Year of publication
1	Chandrashekar A	Game Theory and Networks: New Perspectives and Directions	Linear Games and Complementarity Problems	International conferences on "Game Theory and Networks", organized by the Department of Mathematics, Dibrugarh University, India	International	2021

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*Research projects*

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Name of the Scheme/Project/Endowments/ Chairs	Name of the Principal Investigator/ Co Investigator (if applicable)	Name of the Funding agency	Year of Award	Funds provided (INR in lakhs)	Duration of the project
Linear complementarity Problems over the cone of Completely Positive matrices	Dr.A. Chandrashekar	SERB – ECR	2018	21.2256	2018-2021
Coloring Problems on Zero-divisor graphs	Dr. T. Kavaskar	UGC-BSR Start-up grant	2019	10	2019-2022
A Study on proper Cones with applications to Mathematical Programming	Dr.A. Chandrashekar	SERB	2020	6.6	2020-2023

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### *Research Collaborations*

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Sl. No.	Name and address of the collaborators	Name of the faculty	Duration
1	Prof. A. Zayed, DePaul University, Chicago, USA	Dr.R. Roopkumar	Sep 01,2019 - till date
2	Prof. E.R. Negrin, Universidad de La Laguna, Canary Islands, Spain.	Dr.R. Roopkumar	Apr 26, 2020- tilldate
3	Prof. Thangadurai, Harish-Chandra research Institute, Allahabad	Dr.V P Ramesh	Dec. 17, 2012 - till now
4	Prof. Kapil Sharma, South Asian University New Delhi.	Dr.V P Ramesh	Oct. 25, 2018 - till now
5	Dr K. Sakthivel, Indian Institute of Space, Science and Technology (IIST), Thiruvananthapuram, India	Dr.N. Barani Balan	2017-till Now
6	Dr L. Shangerganesh, NIT Goa	Dr.N. Barani Balan	2014 - till Now

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### *Refresher Course details*

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Name of teacher who attended	Title of the program	Duration
<b>Dr. S. V. Bharanedhar</b>	Online faculty induction Programme, UGC - HRDC, Bharathidasan University, Tiruchirapalli	18.11.2020 to 17.12.2020
<b>Dr. V. P. Ramesh</b>	Online Refresher Course in Mathematics and Statistics, UGC - HRDC , Bharathidasan University, Tiruchirapalli	25.11.2020 to 08.12.2020
<b>Dr N. Barani Balan</b>	Online Refresher Course in Mathematics and Statistics, UGC - HRDC , Bharathidasan University, Tiruchirapalli	25.11.2020 to 08.12. 2020
<b>Dr. T. Kavaskar</b>	Online Refresher Course in Mathematics and Statistics, UGC - HRDC, Bharathidasan University, Tiruchirapalli	25.11.2020to 08.12.2020
<b>Dr A. Chandrashekar</b>	NPTEL Online Certificate - Python for Data Science	Sep-Oct 2020 (4 weeks course)
<b>Dr A. Chandrashekar</b>	NPTEL Online Certificate - Groups: Motion, Symmetry and Puzzles	Sep-Oct 2020 (4 weeks course)

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### *Placement details*

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Year	Name of student placed	Program graduated from	Name of the employer
2021	Devi S	Integrated M.Sc. Mathematics	Spi-Global Services Pvt.Ltd
2021	Valga R	Integrated M.Sc. Mathematics	Spi-Global Services Pvt.Ltd
2021	Yamita Kumari	Integrated M.Sc. Mathematics	Spi-Global Services Pvt.Ltd
2021	Harini C	Integrated M.Sc. Mathematics	Spi-Global Services Pvt.Ltd
2021	Mary Cindrella P S	Integrated M.Sc. Mathematics	Spi-Global Services Pvt.Ltd

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### *Ph.D. awarded*

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S. Gokulraj was awarded Ph.D. in Mathematics under the supervision of Dr. A. Chandrashekar in Month, 2021.

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### *Achievements by students*

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1. S. Gokulraj, Research scholar, got Post-Doctoral Fellow at IIT Bombay in 2021.
  2. Kavitha S, Research scholar, cleared GATE 2021.
  3. Ramkumar SB, Research scholar, cleared GATE 2021.
  4. Ramkumar SB, Research scholar, cleared UGC-JRF 2021.
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### *Paper presentation by Research Scholars*

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1. Presented a paper on "Optimal Control Partial Differential equations and Applications" at National Conference on Mathematical Theory of Control, IIIT Kottayam on 03.07.2020 by Navaneetha Krishnan M.
2. Presented a paper on "Coprime preserver by a special linear map" at International Conference on applied Linear Algebra, Probability and Statistics, Manipal Academy of higher education, Manipal from 17.12.2020 to 18.12.2020 by Shanmugapriya A.
3. Presented a paper on "Non-Darcian gravitactic bio convention with a porous saturates vertical vibration" at 1<sup>st</sup> international Conference on Applied Analysis, Computation and Mathematical Modeling in Engineering, NIT Rourkela from 24.02.2021 to 26.02.2021 by K. Srikanth.
4. Presented a paper on "Vertically vibrated suspension of gyrotactic swimmers in a non-Darcy porous medium" at 2<sup>nd</sup> International Conference on Fluids Under Confinement, IIT Kharagpur from 14.03.2021 to 31.04.2021 by K. Srikanth.
5. Presented a paper on "Instability analysis of vertically vibrated suspension of gyrotactic swimmers in a thermally stratified porous media, National e-conference "Recent Trends in Fluid Dynamics Research", NIT Rourkela from 02.04.2021 to 04.04.2021 by K. Srikanth.



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## *About a Mathematician*

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### **Lovász László**

László Lovász (Hungarian born March 9, 1948) is a Hungarian mathematician and professor emeritus at Eötvös Loránd University, best known for his work in combinatorics, for which he was awarded the 2021 Abel Prize jointly with Avi Wigderson. He was the president of the International Mathematical Union from 2007 to 2010 and the president of the Hungarian Academy of Sciences from 2014 to 2020.

In graph theory, Lovász's notable contributions include the proofs of Kneser's conjecture and the Lovász local lemma, as well as the formulation of the Erdős–Faber–Lovász conjecture. He is also one of the eponymous authors of the LLL lattice reduction algorithm.

Lovász was awarded the Pólya Prize in 1979, the Fulkerson Prize in 1982 and 2012, the Brouwer Medal in 1993, the Wolf Prize and Knuth Prize in 1999, the Gödel Prize in 2001, the John von Neumann Theory Prize in 2006, the János Bolyai Creative Prize in 2007, the Széchenyi Prize in 2008, and the Kyoto Prize in Basic Sciences in 2010. In March 2021, he shared the Abel Prize with Avi Wigderson from the Institute for Advanced Study "for their foundational contributions to theoretical computer science and discrete mathematics, and their leading role in shaping them into central fields of modern mathematics". In 2021, he received Hungary's highest order, the Hungarian Order of Saint Stephen.

He was elected a foreign member of the Royal Netherlands Academy of Arts and Sciences in 2006 and the Royal Swedish Academy of Sciences in 2007, and an honorary member of the London Mathematical Society in 2009. Lovász was elected as a member of the U.S. National Academy of Sciences in 2012. In 2012 he became a fellow of the American Mathematical Society. Lovász is listed as an ISI highly cited researcher.