

ANNUAL REPORT 2020-21

1. Introduction:

The Department of Mathematics was established in 1959 along with the institute. It offers the M.Sc. programme in Mathematics, the M.Tech. programme in Industrial Mathematics and Scientific Computing [IMSC] and the Ph.D. programme. In addition, the department has taken the responsibility of teaching mathematics courses to B.Tech.,M.Tech. (other than IMSC), M.Sc. and Ph.D. students of the institute.

The major research areas of the department are the following:

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| <ol style="list-style-type: none"> 1. Algebraic Combinatorics 2. Algebraic Geometry 3. Algebraic Topology 4. Applied Probability 5. Approximation Theory 6. Category Theory 7. Combinatorial Optimization 8. Combinatorics 9. Combinatorics of Words 10. Commutative Algebra 11. Complex Analysis 12. Conformal Geometry 13. Contact and Symplectic Topology 14. Convective Heat & Mass Transfer 15. Computational Fluid Dynamics 16. Computational Number Theory 17. Cryptology 18. Differential and Integral Equations 19. Differential Topology 20. Fixed Point Theory 21. Fluid Mechanics 22. Functional Analysis 23. Fractals 24. Game Theory 25. Graph Algorithms | <ol style="list-style-type: none"> 26. Graph Theory 27. Harmonic Analysis 28. Inverse and Ill-Posed Problems 29. Linear Algebra 30. Low dimensional Topology 31. Mathematical Modeling 32. Mathematical Study of Ferromagnetic Networks 33. Nonlinear Analysis 34. Nonlinear Analysis of Functional Differential Equations 35. Nonlinear Differential Equations 36. Number Theory 37. Operator Algebras 38. Operator Equations 39. Operator Theory 40. Optimization 41. Partial Differential Equations 42. PDE Numerics 43. Solid Mechanics 44. Special Functions 45. Systems and Control Theory 46. Theory of Codes 47. Theory of Computation 48. Theory of Wavelets 49. Time Frequency Analysis 50. Wave Structure Interactions |
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2. Academic Programmes:

2.1 New discipline/branch introduced: -Nil-

2.2 New courses introduced

2.3 New lab(s) established: -Nil-

2.4 Students on roll as of September 2018+ Ph.D admission in January 2019:

Programme	Number of Students
M.Sc.	77
M.Tech.	43
Ph.D.	112
Total	232

2.5 Endowment prize instituted:

Sl.No	Endowment Prize	Purpose	To be awarded from
1			

**2.6 Names of Student/Scholar who attended Conferences/ /Seminars and Symposia Abroad/India:
Names of Student/Scholar who attended Conferences/ /Seminars and Symposia Abroad/India: Nil**

2.7 Names of students/scholars who won outside prizes and awards:-Nil-

2.8 Name of Students/Scholars who won Institute Convocation/Institute Day Prize:

Sl.No.	Name of the Student/Scholar	Roll No.	Name of Prizes	
1				

3. Faculty and their activities:

3.1. Faculty:

Name and Qualifications	Major area of specialization (only 3 areas)
PROFESSORS:	
Dr. A.K.B. Chand, Ph.D. (IIT Kanpur)	Fractals, Approximation Theory and Wavelets
Prof. Arindama Singh, Ph.D. (IIT Kanpur)	Logic, Numerical Analysis
Prof. S. Ponnusamy, Ph.D. (IIT Kanpur)	Complex Analysis, Function Spaces, Special functions and Conformal Geometry
Prof. R. Radha, Ph.D. (IMSc Chennai)	Harmonic Analysis, Wavelets, Time-Frequency Analysis
Prof. R. Rama, Ph.D. (Anna University)	Formal Language & Automata Theory / Molecular computing
Prof. Y.V.S.S.Sanyasiraju, Ph.D. (IIT Madras)	Computational Fluid Dynamics
Prof. Satyajit Roy, Ph.D. (IISc Bangalore)	Convective Heat and Mass Transfer, Computational Fluid Dynamics
Prof. K.C. Sivakumar, Ph.D. (IIT Madras)	Functional Analysis, Mathematical Programming
Prof. Ch.Srinivasa Rao, Ph.D. (IISc Bangalore)	Non-linear Differential Equations
Dr. S.R. Manam, Ph.D. (IISc Bangalore)	Applied Mathematics
Prof. S. Sundar, Ph.D. (IIT Madras)	Computational Fluid Dynamics, Numerical Analysis for Partial Differential Equations, Mathematical Modeling
Prof. M.Thamban Nair, Ph.D. (IIT Bombay)	Applicable Functional Analysis: Spectral approximation, Operator equations, Inverse & Ill-posed problems.
Prof. P. Veeramani, Ph.D. (IIT Bombay)	Fixed Point Theorems and their Applications to Problems in Optimization and Best Approximation, Fuzzy Set Theory
Prof. V. Vetrivel, Ph.D. (IIT Madras)	Non-Smooth Optimization, Fixed Point Theory, Complementarity problems
Dr. A.V.Jayanthan, Ph.D. (IIT Bombay)	Commutative Algebra and Algebraic Combinatorics
Dr. A.J. Shaiju, Ph.D. (IISc, Bangalore)	Game Theory, Systems and Control Theory
ASSOCIATE PROFESSORS:	
Dr. Kalpana Mahalingam, Ph.D. (Univ. of South Florida, Tampa)	Theory of codes, DNA Computing, Combinatorics of words
Dr. Kunal Krishna Mukherjee, Ph.D. (Texas, A&M)	Operator Algebras
Dr. Neelesh S. Upadhye, Ph.D. (IIT Bombay)	Probability Theory and applications
Dr. Shruti Dubey, Ph.D. (IIT Kanpur)	Nonlinear Analysis of Functional differential equations, Mathematical Study of Ferromagnetic systems
Dr. Sounaka Mishra, Ph.D. (ISI, Kolkata)	Discrete Mathematics, Approximation Algorithm, Combinatorial Optimization
Dr. R. Balaji, Ph.D. (IIT Madras)	Linear Algebra and Optimization

Dr. V.Uma, Ph.D. (IMSC Chennai)	Topology and Geometry of Toric Varieties and Related Spaces
ASSISTANT PROFESSORS:	
Dr. P. Aprameyan, Ph.D	Analysis on symmetric spaces, representations of real Lie groups, geometric quantization.
Dr. T.V.Anoop, Ph.D.(IMSc Chennai)	Linear and Nonlinear Partial Differential Equations, Nonlinear Functional Analysis
Dr. Arijit Dey, Ph.D.	Algebraic Geometry
Dr. Dipramit Majumdar Ph.D. (Brandeis University)	Algebraic Number Theory,p-adic aspects of modular forms and Galois representations
Dr. N. Narayanan, Ph.D. (IMSC,Chennai)	Graph Theory: Graph Colouring, Structural and Extremal Graph TheoryProbabilisticCombinatorics. Discrete Mathematics
Dr. Priyanka Shukla,Ph.D (JNCASR, Bangalore)	Fluid Mechanics: hydrodynamic instability; Nonlinear dynamics;Numerical PDE; Granular flows; Pattern formation
Dr. Ramesh Kasilingam, Ph.D IIT Bombay	Differential and algebraic topology and their interactions with differential geometry
Dr. Santanu Sarkar, Ph.D. (ISI,Kolkata)	Cryptology & Computational Number Theory
Dr. Sarang S.Sane, Ph.D. (TIFR, Bombay)	Commutative Algebra, Homological Algebra, Algebraic K-theory, Algebraic Geometry
Dr. Sivaraman Ambikasaran, Ph.D (Stanford Univ.)	Numerical Linear Algebra, Fast Algorithms, and Scientific Computing
Dr. Soumen Sarkar Ph.D. (ISI, Kolkata)	Algebraic Topology, Geometric Topology, Differential Geometry, Convex Geometry, K-Theory, Topological Complexity, Persistent Homology, Ring of Continuous Functions
Dr. Sriram Balasubramanian, Ph.D. (University of Florida)	Functional Analysis
Dr. Suhas Jaykumar Pandit, Ph.D. (ISI, Bangalore)	Geometric group theory and low dimensional Topology
Dr. Sumesh K. Ph.D (ISI, Bangalore)	Operator algebra
Dr. T.E. VenkataBalaji, Ph.D. (CMI, Chennai)	Algebraic Geometry and Commutative Algebra
EMIRITIES FACULTY:	
Prof. R. Usha, Ph.D. (IIT Madras)	Fluid Dynamics

3.2. Short-term Courses/ Workshops/ Seminars/ Symposia /Conferences organized by the faculty members:

3.3. Short-term Courses/ Workshops/ Seminars/ Symposia/ Conferences/ Training attended by the faculty members in Academic institutions and Public Sector Undertakings:

Sl. No.	Name of faculty	Title	Institution	Period
Workshop:				
1				

3.4. Special Lectures delivered / Academic Participation by the faculty in other Institutions:

Sl. No.	Name of faculty	Topic of Lecture / Academic Participation	Institution	Date
1.	S R Manam	Linear Water Wave Interactions with Flexible Structures	GITAM University, Hyderabad	11, December 2020
2.	S R Manam	Analytical study on wave interaction with a flexible porous plate	IIT Guwahati	13, October 2020
3.	Arindama Singh	Goedel's Incompleteness Theorems	IIT Tirupati	Mar 12, 2020
4.	Arindama Singh	Linear Algebra (8 hours series of lectures)	Gudlavalleru Engg. College	Oct 31- Nov 1, 2020
5.	Arindama Singh	Modification of Arnoldi Iteration	Int Conf, SSN College	Nov 25, 2020
6.	Arindama Singh	Turing Machines	SASTRA Univ	Dec 02, 2020
7.	Arindama Singh	Proving a program shortest	Int Conf, NIT Agartala	Dec 24, 2020
8.	Arindama Singh	Existence of Eigenvalue	Ramanujan Inst.	Mar 04, 2020
9.	Venkata Balaji TE	What is Geometry? Lecture as Chief Guest for Ramanujan Day Celebrations	KV IIT Madras	22nd December 2020
10.	Vetrivel V	On Convex Optimization	BIT, Mesra Ranchi	12.02.2021
11.	Vetrivel V	8th Expert committee Meeting for the Projects Evaluation under ECRA	DST- SERB	26 -28 August, 2020
12.	Vetrivel V	2nd Expert committee Meeting for the Project Evaluation under MATRICS scheme	DST- SERB	6 - 9 October, 2020
13.	Vetrivel V	9th Expert committee Meeting for the selection of NPDP	DST- SERB	4 - 6 November, 2020.
14.	Vetrivel V	10th Expert committee Meeting for the Projects Evaluation under ECRA	DST- SERB	1-5th February, 2021.
15.	Vetrivel V	8th Expert committee Meeting for the Projects Evaluation under ECRA	DST- SERB	16 -19th March, 20201
16.	S Ponnusamy	Invitation to Complex Analysis	Mathematics Webinar Week held during 22.06.2020 to 27.06.2020. held at Pioneer Kumaraswamy College, Nagarkoioi, Tamilnadu, India	June 22, 2020
17.	S Ponnusamy	An Invitation to Advanced Complex Analysis	Summer School in Mathematics, held at Kalna College, Kalna, West Bengal	July 12, 2020
18.	S Ponnusamy	The Bohr inequality for the generalized Cesaro averaging operators	Congressio-Mathematica VI, Olsztyn, Poland (online)	November 28, 2020
19.	S Ponnusamy	The man who knew infinity	National Mathematics Day-2020, held at Department of Mathematics, Chandigarh University, December 22, 2020	December 22, 2020
20.	S Ponnusamy	Bohr Inequality	"Srinivasa Ramanujan Memorial Lecture Series" -- Dharwad, December 22 -24, 2020	December 23, 2020
21.	S Ponnusamy	Schwarz-Pick, Liouville and Picard theorems	Jammu Refresher Course, Jammu, India	January 16, 2021
22.	S Ponnusamy	Planar Harmonic Mappings	Ramanujan Insitute of Advanced Study in Mathematics (R. Vaidyanathaswamy Endowment Lecture)	February 19, 2021
23.	S Ponnusamy	Problems and Conjectures on Planar Harmonic Mappings	1st International Conference on Applied Analysis, Computation and Mathematical Modelling in Engineering, held at National Institute of Technology, Rourkela (Feb. 24-26)	February 25, 2021

24.	S Ponnusamy	Foundations of Complex Analysis	M. Janakiraman Endowment Lecture, St. Joseph College, Trichy, India.	February 26, 2021
25.	S Ponnusamy	Recent Approaches to Bohr's Inequality	International Conference on Mathematics and Computing (ICMC2021) held at Department of Information Technology, Indian Institute of Engineering Science and Technology, Shibpur, India (Online)	March 02, 2021
26.	Dr. Satyajit Roy	Applications of Natural/ Mixed convection flows within cavities	N.I.T., Rourkela	25-02-2021
27.	Dr.Satyajit Roy	Role of Mathematical modeling in industrial waste management system using mixed convection phenomena	Rajiv Gandhi University (A Central University) Arunachal Pradesh	01-09-2020
28.	Dr.Satyajit Roy	Mass Transfer in Boundary Layer Flows	N.I.T. Andhra Pradesh	04-11-2020
29.	Shruti Dubey	Fractional Differential Equations	National Institute of Technology, Andhra Pradesh	6/11/2020
30.	Shruti Dubey	Study of Navier-Stokes Equation with Time Fractional Derivative	SRM Institute of Science and Technology, Tamilnadu	5/3/2021
31.	Ramesh Kasilingam	Smooth Structure on the complex projective spaces	Symposium on "Topology and Geometry" in the annual meeting of the Indian Mathematical Association to be held during 17--20 Dec 2020 at VIT Vellore, Tamil Nadu. India	18-Dec, 2020
32.	Ramesh Kasilingam	Fundamental Problems in Mathematics	Ramanujan Institute for Advanced Study in Mathematics, University of Madras, Chennai, Tamil Nadu, India	4 Feb, 2021
33.	Ramesh Kasilingam	DIVISION ALGEBRAS AND TOPOLOGY	6th Biennial International Group Theory Conference – 2021 (6BIGTC–2021)" at Vellore Institute of Technology, Vellore, Tamil Nadu, India	6 March, 2021
34.	Sumesh K	Spectral theorem for complex normal operators	Mar Thoma College, Thiruvalla, Kerala	30/09/2020
35.	Sumesh K	Separability and entanglement	University of Kerala	11/02/2021
36.	Y V S S Sanyasiraju	Higher order compact scheme for incompressible flow problems	Department of Mathematics, School of Applied Sciences, Reva University Bangalore	January 13, 2021
37.	Y V S S Sanyasiraju	Meshless numerical schemes	Faculty Development Programme on Mathematics and Its Applications in Science & Technology, Department of Mathematics Faculty of Engineering and Technology SRM Institute of Science and Technology	July 11, 2020
38.	Y V S S Sanyasiraju	Higher order finite difference schemes for viscous incompressible flow problems	National Webinar on Fluid dynamics from mathematicians point of view - (FDFMVP-2020), Department of Mathematics GITAM deemed to be university, Hyderabad	August 12, 2020

39.	Y V S S Sanyasiraju	Finite difference and finite volume methods for fluid flow problems	AICTE sponsored STTP on "Innovative Techniques for Sustainable Energy Development through Modeling of Mechanical Processes - (SERIES-II)" been conducted by Department of Mechanical Engineering,, K.L.N College of Engineering, Madurai	September 14, 2020
40.	Y V S S Sanyasiraju	Capturing moving interfaces in a RBF based grid free environment	Symposium on Iterative methods and PDE which is a part of the international conference Synergies in Computational, Mathematical, Statistical and Physical Sciences, been conducted by Stella Maris and SSN colleges Chennai	November 25, 2020
41.	Y V S S Sanyasiraju	Shape parameter optimization of the RBF functions for solving the PDE	35th Annual Conference of Ramanujan Mathematical Society been conducted by Department of Mathematics, Central University of Rajasthan	Decembr 30, 2020
42.	Y V S S Sanyasiraju	Expert member, Faculty recruitment	Department of Mathematics, Rajiv Gandhi University of Knowledge Technologies-AP (RK VALLEY, NUZVID, ONGOLE, SRIKAKULAM campuses)	March 7-9, 2021
43.	Y V S S Sanyasiraju	Expert member, Faculty recruitment	Department of Mathematics, VIT Vellore	March 6, 2021
44.	Y V S S Sanyasiraju	Expert Member (online) Faculty recruitment	GITAM Campuses	June 8, 2020
45.	Y V S S Sanyasiraju	Expert Member in Selection committee (online Meeting) to consider the promotion from Associate Professor to Professor	Defense Institute of Advanced Technology, Girinagar, Pune	July 27, 2020
46.	Y V S S Sanyasiraju	Board of studies meeting (Online) as an University Nominee and External Expert Member	Department of Mathematics, Audisankara College of Engineering and Technology	Sept 4, 2020
47.	Y V S S Sanyasiraju	Board of studies meeting (Online) as Subject Expert Member	Department of Mathematics, JNTU Ananthapur	November 24, 2020
48.	Y V S S Sanyasiraju	Combined Board of studies meeting (Online) as Subject Expert Member	Department of Mathematics, Rajiv Gandhi University of Knowledge Technologies-AP (RK VALLEY, NUZVID, ONGOLE, SRIKAKULAM campuses)	December 31, 2020
49.	Y V S S Sanyasiraju	Board of studies meeting (Online) as Subject Expert Member	Department of Mathematics, Sri Venkateswara College of Engineering and Technology, Chithoor	January 11, 2021
50.	Soumen Sarkar	Blow-ups and blow-downs of toric orbifolds	The Fields Institute	24 January 2020
51.	Soumen Sarkar	On LS-category and topological complexity of some n -ber bundles and Dold manifolds	HSE, Moscow	22 November 2020
52.	Soumen Sarkar	Torsion in the cohomology of blowups and blowdowns of quasitoric orbifolds	Vietnam National University	17 December 2020
53.	A. K. B. Chand	Cyclic Iterated Function Systems, 2nd International Conference on Mathematics Techniques and Applications (e- ICMTA-2021)	SRM Institute of Science and Technology, Chennai	March 24-26, 2021.

54.	A. K. B. Chand	Nonlinearity and Fractals	National Workshop on Data Science and Advanced Computing (online), VIT-AP University, Vijayawada	March 19-21, 2021
55.	A. K. B. Chand	Iterated Function Systems and Fractals	National Webinar on Recent Trends in Mathematics, Shailabala Women's Autonomous College, Cuttack	January 5, 2021
56.	A. K. B. Chand	Deep Learning and Self-similarity	AICTE-ISTE Idunction Program on Deep Learning, Birla Institute of Technology Mesra, Ranchi	December 14-19, 2020
57.	Sundar S	"Pedestrian Crowd Dynamics Modeling" in the symposium: "Mathematics in Industry: Modeling, Optimization and Simulation" IMS Annual Conference 2020, (Online)	VIT University, Vellore	December 17 – 20, 2020,
58.	Sundar S	A talk on "Particles in Fluids: Modeling and Methods" at the 28 th International Conference (virtual) of Forum of Interdisciplinary Mathematics	Forum of Interdisciplinary Mathematics held during	27-30 November 2020
59.	Sundar S	A talk on "Pedestrian Crowd Dynamics Modeling using Social and Behavioral Forces" at the International Winter School on Fluid Dynamics organized	NIT Utharakand during.	January 18 – 21, 2021
60.	Sundar S	A talk on "Fluid Structure Interaction using a MeshFree Method" at the International Conference	Research Frontiers in Science (online mode)	5 – 6, February, 2021
61.	Sundar S	Faculty Selection Committee Expert	IIT Delhi	6 th February 2021.
62.	Sundar S	Faculty Selection Committee Expert	IIT BHU	11 th February 2020
63.	Sundar S	Faculty Selection Committee Expert	BITS	16 th May 2020
64.	Sundar S	Faculty Selection Committee Expert	IIITDM Kurnool	22 nd December 2020
65.	Sundar S	Faculty Selection Committee Expert	IIT Bhilai	23 – 24 December 2020
66.	Sundar S	Projects Selection Committee Expert.	DST –SERB, POWER New Delhi	9 th February 2021
67.	Sundar S	DST – SERB	PAC on Mathematical Sciences	10 th December 2020.
68.	Sundar S	DST – SERB	PAC on Mathematical Sciences	10 th December 2020.

3.5. Visits abroad by faculty:

Sl. No.	Name of faculty	Country Visited	Date	Purpose of visit	Funding from
1.	Jayanthan A. V.	Canada	20 – 28 Jan 2020	Conference	CPDA
2.	Santanu Sarkar	Germany	5/12/2020-Till date	Research	Humboldt

3.6 Honours and Awards obtained by faculty:

Sl. No.	Name of faculty	Name of Award	Awarded by	Awarded for	Date of award
i. Honours:					
	Shruti Dubey	Elected member of NASI	NASI		2019 onward

ii. Awards:					

3.7. Fellowships of Academies and Professional Societies:

Sl. No.	Name of faculty	Year of admission
Humboldt Fellowship:		
	Dr. Santanu Sarkar	Humboldt Fellowship: 2020-2022 (15 months)
INAE:		
INSA:		
FRA:		
ISTE/CSI:		
Others:		

3.8 Journal Editorial Boards:

Sl. No.	Name of faculty	Position (Editor/Member)	Journal Name
1.	S Ponnusamy	Editorial Member	Journal of Inequalities and Applications (Springer)
2.	Shruti Dubey	Guest Editor	Differential Equations and Dynamical Systems 29,1(2021)
3.	Y V S S Sanyasiraju	Editor	The Mathematics Consortium Bulletin

5.1 Sponsored Research Projects: (on going & new)

Sl. No.	Title	Period	Funding Agency	Amount (Rs. in lakhs)	Co-ordinators
1.	Mathematical Study of Anomalous Diffusion Processes via Partial Differential Equations	2020-2023	SERB (Science and Engineering Research Board)	6,60,000	Dr. Shruti Dubey
2.	CP-maps, entanglement breaking quantum channels, CP-H-extendable maps and their multiplicative domains	12/Jan/2021 To 11/Jan/2024	SERB (Science and Engineering Research Board)	6,60,000	Sumesh K
3.	CFD of thin film flow on substrates featuring topography Coordinator : Y V S S Sanyasiraju	Oct 2018 – Oct 2021	SERB, DST, India	Rs.19, 98, 069	Prof. R Usha

4.	Arithmetical aspects of the Fourier coefficients of modular forms	2019-2021	SPARC	40	Sanoli Gun Dipramit Majumdar Yuri Bilu Jean Marc Deshouillers
5.	Relating p-Selmer group of elliptic curves and p-Class group of Number Fields	2021	IIT Madras ERP	7.5	Dipramit Majumdar
6.	Fields Institute Visit Dr. Soumen Sarkar	1 – 6 months	Fields Institute	2.2 Lakhs	Prof. Don Stanley and Prof. A. Bahri, Prof. Lisa Jeffrey
7.	"Evolutionary Stability in Asymmetric Games with Continuous Strategy Space".	28.05.2018-27.05.2021	DST	6,60,000	Dr. A. J. Shaiju
8.	Computational Mathematics and Data Science	March 2021	Centre of Excellence under Institute of Eminence, Govt. of India	4 Crores	PI: Dr. Neelesh S Upadhye Co PI: Prof. Sundar S
9.	Quantum Analysis	March 2021	Centre of Excellence under Institute of Eminence, Govt. of India	80 Lakhs	PI:Dr. Kunal Krishna Mukherjee Co PI: Dr. Sumesh and Dr. Aprameyan P
10.	Algebraic Geometry	Feb 2021	Centre of Excellence under Institute of Eminence, Govt. of India	75 Lakhs	PI: Dr. Arijit Dey

5.2 Industrial Consultancy projects: (on going & new)

Sl. No.	Name of faculty	Title	Industry	Amount (Rs. in lakhs)

5.3 RBIC projects: (on going & new)

Sl. No.	Name of faculty	Title	Industry	Amount (Rs. in lakhs)

5.4 Retainer Consultancy: (on going & new)

Sl.No.	Name of faculty	Title	Industry	Amount (Rs. in lakhs)

5.5 Exchange programme with other Universities including Institutions/Universities under MOU;

Mr. Vyshakh B R, 5 Year BS and MS student of IISER Tirupati, has carried out his full ONE YEAR project, titled "Thin film flow over inclined plane featuring topography" successfully under my sole guidance (No other supervisor including at IISER, Tirupati), June 2020.

5.6 Faculty members participation with other institution under MoU:

Sl. No.	Name of faculty	Participation details	Name of University/Institution which has MoU