



DEPARTMENT OF MATHEMATICS

SARDAR VALLABHBHAI NATIONAL INSTITUTE OF TECHNOLOGY

# PRAMITI

**2025**



# Welcome Note

## From the Head of the Department



Welcome to the latest issue of our departmental magazine, Pramiti 2025. It gives me great pleasure to introduce this issue, which highlights the vibrant and intellectually stimulating environment of our Mathematics Department. As we dig into the intriguing realm of mathematics, we discover a discipline that is not only the foundation of scientific and technological progress, but is also intimately woven into the fabric of our everyday lives.

Mathematics is often seen as abstract and theoretical, yet in the era of artificial intelligence, its adaptability has become more relevant than ever. The algorithms that drive AI, machine learning models, and data-driven decision-making all rest upon solid mathematical foundations. By developing logical reasoning, pattern recognition, and analytical thinking, mathematics equips us to harness AI's potential, adapt to emerging technologies, and tackle complex real-world problems. These skills prepare us not just to understand AI, but to innovate and shape its applications responsibly, ensuring that mathematical insight continues to guide progress in an ever-evolving digital world.

As we mark another year of academic success and innovation, I'd like to express my heartfelt congratulations to the graduating class of 2025. Your devotion, determination, and intellectual curiosity have led you to this remarkable achievement. As you embark on the next leg of your journey, I am convinced that the strong mathematical foundation you have established here will serve you well in all of your future activities. May you continue to discover, invent, and inspire, keeping on the tradition of excellence that defines our department.

Congratulations, Class of 2025. We are extremely proud of your accomplishments and look forward to seeing your future success.

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# About



## Vision

To be a model for excellence in educational research in Mathematics and Humanities in order to meet the changing needs of society.

## Mission

To become an exemplary Centre of Excellence for research and training in the Mathematical Sciences and Humanities by promoting learning, growth and development of young minds and finding solutions to scientific, technological and real-life problems.

In March 2023, the Department of Mathematics received its current status. Before that from 2021 to 2023, it was part of the Department of Mathematics & Humanities. Since 2009, it has been Applied Mathematics & Humanities, and before that, it was part of the Applied Sciences and Humanities Department. Throughout these years, the department has evolved into one of the epicenters of research in India. Since 2007, the department has been offering its own 5 years Integrated M.Sc. Degree Program in Mathematics, in which students are enrolled through the Joint Entrance Examination (JEE Mains).

The department offers courses in Mathematics to undergraduate and postgraduate students in Engineering and other Science courses. Several alumni from this department have attained prestigious positions in teaching and research in India and abroad. The department has highly qualified faculty members including three Professors, five Associate Professors, and eight Assistant Professors, who have extensive expertise in Fluid Mechanics, Special functions, Algebra, Integral Transforms, Approximation theory, Mathematical modeling, Magnetic fluid dynamics, Bio-mathematics, Data Mining, and Finite element modeling.

In total 259+ students have enrolled in the department for Five Years Integrated M.Sc., and 60+ Ph.D. students are presently pursuing research. In total, 749+ papers have been published by the Department in the reputed SCI/SCIE and Scopus-indexed journals. During the last five years, the department has published 117 H index papers and 109 i10 index papers. A total of INR 2,11,00,000/- worth of projects have been carried out by the department in the last five years funded by different agencies such as the Department of Science and Technology (DST), NBHM, ISRO, and GUJCOST. So far, the department has produced 107+ Ph.D. students specializing in Mathematics and the department has a good placement record as well.

# Academics

## Doctor of Philosophy

Department offers Ph.D. programmes in Mathematics. The department provides excellent research opportunities to students in aforementioned fields. It is noteworthy that the faculty members pursue research in a wide range of areas such as fluid mechanics, special functions, algebra, integral transforms, approximation theory, mathematical modeling, magnetic fluid dynamics, bio mathematics, data mining, finite element modeling, among others. Several scholars have achieved very good positions in academia and industry. Admissions are usually made twice a year and are notified by the institute on a regular basis. Students will also be admitted to individual faculties under their designated projects, and after evaluating their performance, they will be converted to regular Ph.D. program.

## Integrated Master of Science

The Department's flagship program, the Five-Year Integrated Master in Science Mathematics, was introduced in 2007 in order to meet the need for quality mathematicians. It is a 10 semester program, where in the first nine semesters, students will study the regular courses offered by the department and other departments (as electives), and in the last semester, they will work on a dissertation in their area of interest under the faculty of the department (or any other faculty from a reputed institute). The curriculum of the course was revised in 2019 in order to meet the societal demands, which, at present, exceed the standard requirement of the graduate. Students have been placed in good companies in the past, and they continue to perform excellently. The institute offers admission through JoSAA and 50 seats are available for students throughout the country.

## B.Tech in Mathematics and Computing

Mathematics and computing are most relevant to each other which can step up to the challenges of the upcoming age of artificial intelligence and computer assisted technologies where a strong mathematics foundation is required. B.Tech. in Mathematics and Computing programme is perfectly blended with a formidable combination of mathematical and computing components that are in-built in the curriculum to meet the need of sophisticated mathematics in modern scientific investigations and technological innovations. The programme focuses broadly on mathematical part of computer science such as Algorithms, Data Science and Analytics, Statistics, Machine Learning and Artificial Intelligence, Analysis etc., to boost the industrial growth and facilitate the mankind as well. The curriculum is designed to give the theoretical knowledge, practical training and industry internship. It offers promising career opportunities with high-salaried packages and is in increasing demand of the industry after such and similar programme in IITs in particular. We intend to start the program with an intake of 30 students.

Furthermore, the department supports and runs regular courses as a part of the academic degree requirements as required by each department in addition to the above programs

# Faculty

## Mathematics



**Dr. A. K. Shukla**  
Professor (Mathematics)

**Area of Research**

Special functions, Integral transforms & Fractional Calculus



**Dr. V. H. Pradhan**  
Professor (Mathematics)

**Area of Research**

Fluid dynamics in porous media with relevance to ground water flow and petroleum recovery, Numerical techniques

<https://sites.google.com/amhd.svnit.ac.in/dr-v-h-pradhan/home>



**Dr. Neeru Adlakha**  
Professor (Mathematics)

**Area of Research**

Mathematical and Computational Biology, Bioinformatics/Biomathematics / Biocomputing, Data mining, Finite element modeling



**Dr. Sushil Kumar**  
Associate Professor (Mathematics)

**Area of Research**

Mathematical modeling, Bio-mechanics, Fractional Differential equations, Moving Boundary Problems, Bio-mechanics, Numerical Techniques, Radial Basis Functions, Chebyshev Polynomials

<https://sites.google.com/view/sushil/home>



**Dr. Jayesh M. Dhodiya**  
Associate Professor (Mathematics)

**Area of Research**

Advance Operation Research, Optimization Technique, Mathematical Modeling and Simulation, Knowledge Based System, Data Mining

<https://sites.google.com/view/drjayeshmdhodiya/home>



**Dr. Ranjan Kumar Jana**  
Associate Professor (Mathematics)

**Area of Research**

Special Functions and Integral Transform, Operations Research. Mathematical Physics, Fractional Calculus, Mittag-Leffler function, Numerical Weather Prediction, Ramanujan's Mathematics

<https://sites.google.com/amhd.svnit.ac.in/drranjankumarjana/home>

<https://sites.google.com/amhd.svnit.ac.in/drranjankumarjana/home>



**Dr. Twinkle R. Singh**  
**Associate Professor (Mathematics)**

**Area of Research**

Fluid flow through Porous media, Non-linear partial differential equations, Burger's equation, Groundwater recharge phenomenon, Analytical approximate Methods, Mathematical Modeling  
<https://sites.google.com/amhd.svnit.ac.in/twinklesingh/home>



**Dr. Ramakanta Meher**  
**Associate Professor (Mathematics)**

**Area of Research**

Differential Equations, Fractional Differential Equations, Fluid Dynamics, Fluid flow through Porous Media, Approximation theory, Numerical Analysis  
<https://sites.google.com/site/drramakantameher>



**Dr. Indira P. Tripathi**  
**Assistant Professor (Mathematics)**

**Area of Research**

Mathematical Programming Problems, Non-smooth Optimization, Fractional Programming problems, Interval-Valued Optimization, Generalized Convexity, I-fuzzy/Fuzzy Optimization, Variational Control Problems  
<https://sites.google.com/view/dr-indira-tripathi/home>



**Dr. Shailesh Kumar Srivastava**  
**Assistant Professor (Mathematics)**

**Area of Research**

Trigonometric Fourier Approximation  
<https://sites.google.com/view/shaileshsrivastava/home>



**Dr. Raj Kamal Maurya**  
**Assistant Professor (Mathematics)**

**Area of Research**

Reliability Theory and Survival Analysis, Estimation under various Censoring, Competing Risk, Optimum Plan  
<https://sites.google.com/view/dr-raj-kamal-maurya/home>



**Dr. Amit Sharma**  
**Assistant Professor (Mathematics)**

**Area of Research**

Algebraic Coding Theory: Constructions of error-correcting codes such as linear codes over finite rings, skew codes, quantum codes  
<https://www.apsharma.com/>



**Dr. Sudeep Singh Sanga**  
**Assistant Professor (Mathematics)**

**Area of Research**

Queueing Theory

<https://sites.google.com/view/sudeepsinghsanga/home?authuser=0>

<https://sites.google.com/view/sudeepsinghsanga/home?authuser=0>



**Dr. Saroj R. Yadav**  
**Assistant Professor (Mathematics)**

**Area of Research**

Mathematical Modeling, Non-Linear Partial Differential Equations, Fractional Differential Equations, Analytical Approximate Methods, Numerical Methods, Fluid Dynamics, Fluid Flow through Porous Media



**Dr. Sourav Gupta**  
**Assistant Professor (Mathematics)**

**Area of Research**

Linear Water Wave Theory, Integral Equations, Numerical Analysis

<https://sites.google.com/amhd.svnit.ac.in/dr-sourav-gupta>



**Dr. Shivam Bajpeyi**  
**Assistant Professor (Mathematics)**

**Area of Research**

Functional Analysis, Applied Harmonic Analysis, Sampling-Reconstruction Problems, Neural Network Approximation

<https://sites.google.com/view/shivambajpeyi/home>

## Teaching Assistants



**Dr. Krupa Desai**



**Dr. Mihir Panchal**



**Dr. Gomati Amitkumar  
Tailor**

## Non-Teaching Staff



**Mr. Divyesh P. Patel**  
(Lab Assistant)



**Ms. Km Gunjan Singh**  
(Technician)



**Mr. Behera Vrajbandhu  
Jayaram**  
(Technician)



**Mr. Vinod Patel**  
(Clerk)



**Mr. Jitendra J. Patel**  
(Peon)



**Mr. Pramod R. Solanki**  
(Peon)

# Responsibilities

S. No.	Duties Assigned	Name
1	PG In-charge	Dr. R. K. Meher
2	Secretary, Department Meeting	Dr. Indira P. Debnath
3	Member Secretary, DAAC	Dr. Twinkle R. Singh
4	UG In-charge	Dr. Jayesh M. Dhodiya
5	Coordinator, Research Project	Dr. R. K. Jana Prof. V. H. Pradhan Dr. Jayesh M. Dhodiya
6	Coordinators, Ph. D Credit, Progress Seminars & Registration	Prof. A. K. Shukla Dr. T. R. Singh
7	Coordinators, Teachers' Evaluation	Prof. A. K. Shukla Prof. V. H. Pradhan Prof. Neeru Adlakha Dr. R. K. Meher
8	Coordinator, Annual Report, Faculty/ Student related data, MIS etc.	Dr. S. Kumar Dr. Shailesh Kumar Srivastava Dr. Indira P. Debnath Dr. Sudeep Singh Sanga
9	Coordinators, Work Load & Time Table	Prof. A. K. Shukla Dr. T. R. Singh Dr. Indira P. Debnath Dr. Amit Sharma
10	Department Examinations Cell	Dr. S. Kumar Dr. Shailesh Kumar Srivastava Dr. Sudeep Singh Sanga Dr. Sourav Gupta
11	Students' Grievances Committee	Prof. A. K. Shukla Prof. V. H. Pradhan Prof. Neeru Adlakha Dr. R. K. Meher Dr. Jayesh M. Dhodiya
12	Website Management	Dr. Sourav Gupta Dr. Amit Sharma Dr. Jayesh M. Dhodiya
13	Coordinators, Magazine, Department Annual Booklet	Dr. Indira P. Debnath Dr. Saroj R. Yadav Dr. Raj Kamal Maurya Dr. Jayesh M. Dhodiya
14	Coordinators, Training and Placement	Dr. T. R. Singh Dr. R. K. Jana Dr. Sudeep Singh Sanga
15	Coordinators, TEQIP, CCE	Dr. R. K. Jana Dr. Raj Kamal Maurya

(Continued on the next page.)

16	Coordinators, Maintenance, Cleaning & Gardening	Dr. R. K. Jana Prof. Neeru Adlakha Dr. S. Kumar Dr. Amit Sharma Dr. Jayesh M. Dhodiya
17	Coordinators, Services to Community & Tribal Development	Dr. R. K. Jana Dr. Jayesh M. Dhodiya
18	Finance Committee (DOC & Annual Plan Grant)	Prof. A. K. Shukla Prof. V. H. Pradhan Prof. Neeru Adlakha Dr. S. Kumar Dr. Jayesh M. Dhodiya Dr. T. R. Singh
19	Purchase Committee	Prof. A. K. Shukla Prof. V. H. Pradhan Prof. Neeru Adlakha Dr. S. Kumar Dr. Jayesh M Dhodiya
20	Coordinators, Stock Verification	Prof. Neeru Adlakha Dr. T. R. Singh Dr. Amit Sharma Dr. Raj Kamal Maurya
21	Department Library Committee	Dr. Sourav Gupta Dr. Raj Kamal Maurya
22	Lab In-charges, Computer Lab	Dr. S. Kumar
23	Mathematics related event organization and Day Celebrations: (Teachers Day Celebration, Mathematics Day Celebration, Expert Talk organization, Workshop organization, etc.)	Prof. A. K. Shukla Prof. V. H. Pradhan Dr. R. K. Meher Dr. T. R. Singh Dr. Sudeep Singh Sanga Dr. Saroj R. Yadav Dr. Jayesh M. Dhodiya
25	Committee for NET/GATE Examination preparation	Prof. V. H. Pradhan Prof. Neeru Adlakha Dr. S. Kumar Dr. Jayesh M. Dhodiya Dr. Indira P. Debnath Dr. Shailesh Kumar Srivastava Dr. Amit Sharma Dr. Raj Kamal Maurya Dr. Sudeep Singh Sanga Dr. Sourav Gupta Dr. Saroj R. Yadav
26	Faculty Advisors	
	M.Sc. 1 <sup>st</sup> Year	Prof. A. K. Shukla
	M.Sc. 2 <sup>nd</sup> Year	Dr. S. Kumar
	M.Sc. 3 <sup>rd</sup> Year	Prof. V. H. Pradhan
	M.Sc. 4 <sup>th</sup> Year	Dr. R. K. Jana
	M.Sc. 5 <sup>th</sup> Year	Prof. Neeru Adlakha
27	GEM Coordinator	Dr. Sourav Gupta

# Placements



**Rahul Maurya**

- Company: National Stock Exchange



**Ishika Sanghavi**

- Company: Deloitte USI



**Gaurav Gupta**

- Company: PlanetSpark



**Khalid Sheikh**

- Company: TCS R & I



**Sahina Mithani**

- Company: CFE - PP Savani



**Chandan Saraf**

- Company: Fristine Tech (Internship)



**Sauparnika Nair**

- Company: TCS NQT



**Athul Raj K.**

- Company: TCS NQT



**Chandan Saraf**

- Company: TCS NQT



**Prashant Shrivastava**

- Company: Snaptrude



**Raj Kumar Sah**

- Company: Vibration Academy



**Mahesh Kumar**

- Company: Vibration Academy



**Abhishek Deshmukh**

- Company: Vibration Academy



**Unnati Parmar**

- Company: Avanti Fellows



**Rohit Rai**

- Company: ESAF Small Finance Bank



**Aman Bosmiya**

- Company: ESAF Small Finance Bank



**Deepak Singh**

- Company: ESAF Small Finance Bank



**Aadarsh Kumar**

- Company: NJ Charitable Foundation



**Dushyant**

- Company: VC Classes

## Journal Publications

- M. S. Palav and V. H. Pradhan, *Redefined fourth order uniform hyperbolic polynomial B-splines based collocation method for solving advection-diffusion equation*, Appl. Math. Comput. **484** (2025), article no. 128992, DOI: 10.1016/j.amc.2024.128992 (21 pages).
- M. Palav and V. Pradhan, *Efficient numerical solution of Burgers' equation using collocation method based on re-defined uniform hyperbolic polynomial B-splines*, J. Appl. Math. Comput. **71** (2025), 4429–4474, DOI: 10.1007/s12190-025-02390-7.
- M. S. Palav and V. H. Pradhan, *B-Spline finite element solution of 1D contaminant transport equation along unsteady flow in saturated contaminant free porous media with general boundary conditions*, Int. J. Comput. Sci. Math. **20** (2024), no. 4, 353–369, DOI: 10.1504/IJCSM.2024.10067931
- R. K. Meena and S. Kumar, *A semi-analytical solutions of the multi-dimensional time-fractional Klein-Gordon equations using residual power series method*, Phys. Scr. **99** (2024), no. 9, article no. 095268, DOI: 10.1088/1402-4896/ad6fe5 (16 pages).
- H. Sakariya and S. Kumar, *Numerical study of the variable-order time-fractional KP-BBM equation in 2D using RBFs*, Phys. Scr. **100** (2025), no. 1, article no. 015299, DOI: 10.1088/1402-4896/ada094 (19 pages).
- R. K. Meena and S. Kumar, *Semi-analytical solutions of the multi-dimensional time-fractional solitary water wave equations using RPS method*, Math. Methods Appl. Sci. **48** (2025), no. 5, 6208–6221, DOI: 10.1002/mma.10665.
- R. K. Meena and S. Kumar, *A Comprehensive Study of the Multi-Dimensional Time-Fractional Korteweg-de Vries Equation Using the Residual Power Series Method*, Spec. Top. Rev. Porous Media **16** (2025), no. 3, 1–19, DOI: 10.1615/SpecialTopicsRevPorousMedia.2024055283.
- R. Gupta and S. Kumar, *A space-time spectral collocation method for two-dimensional variable-order space-time fractional advection-diffusion equation*, Int. J. Appl. Comput. Math. **11** (2025), article no. 46, DOI: 10.1007/s40819-025-01843-8.
- S. Kumar and B. S. Meena, *Computational study on SPL and DPL bio-heat models of heat transfer in irregular tumors during magnetic nanoparticles hyperthermia*, ASME J. Heat Mass Transfer **147** (2025), no. 6, article no. 061202, DOI: 10.1115/1.4067918 (12 pages).
- H. Sakariya, R. S. Prasad, and S. Kumar, *A study on brain tumor dynamics in two-dimensional irregular domain with variable-order time-fractional derivative*, Comput. Methods Programs Biomed. **264** (2025), article no. 108700, DOI: 10.1016/j.cmpb.2025.108700 (20 pages).
- A. S. Todkar and J. M. Dhodiya, *Genetic algorithm variants for solving multi-objective multi-route shortest path problem: application to transportation and logistics*, Sādhanā **49** (2024), article no. 273, DOI: 10.1007/s12046-024-02613-w (15 pages).
- S. B. Bhoi and J. M. Dhodiya, *Multi-objective university rescheduling problem by fuzzy programming technique*, Eur. J. Ind. Eng. **18** (2024), no. 6, 885–909, DOI: 10.1504/EJIE.2024.141736.
- A. S. Bajaj and J. M. Dhodiya, *Solution of uncertain constrained multi-objective travelling salesman problem with aspiration level based multi objective quasi oppositional Jaya algorithm*, Int. J. Uncertain. Fuzziness Knowl.-Based Syst. **32** (2024), no. 2, 209–253, DOI: 10.1142/S0218488524500090.
- A. Bajaj and J. Dhodiya, *Multi-route multi-objective TSP: mathematical model and its solution by reference point and aspiration level-based MOQO Jaya algorithm*, Neural Comput. Appl. **37** (2025), 10243–10285, DOI: 10.1007/s00521-025-11029-4.
- A. S. Bajaj and J. M. Dhodiya, *Sustainable 4D TSP to reduce carbon emission using reference point MOQO Jaya algorithm in uncertain environment*, J. Clean. Prod. **486** (2025), article no. 144487, DOI: 10.1016/j.jclepro.2024.144487 (24 pages).

- A. S. Bajaj and J. M. Dhodiya, *Sustainable multi-depot multiple travelling salesman problem by robust multi objective quasi oppositional Jaya algorithm: a case study of Surat City*, J. Ind. Manag. Optim. **21** (2025), no. 4, 2885–2924, DOI: 10.3934/jimo.2024198.
- A. S. Bajaj and J. M. Dhodiya, *Sustainable multiple travelling salesman problem solved by reference point aspiration level based multi objective quasi oppositional Jaya algorithm under uncertain environment*, Evol. Intell. **17** (2024), 2577–2616, DOI: 10.1007/s12065-023-00904-5.
- A. Bajaj and J. Dhodiya, *Aspiration Level Based Multi-Objective Quasi Oppositional Jaya Algorithm to Solve Constrained Multi-Objective Solid Traveling Salesman Problem*, Am. J. Math. Manag. Sci. **43** (2024), no. 3, 193–233, DOI: 10.1080/01966324.2024.2443832.
- E. Jain and J. M. Dhodiya, *Fuzzy multi-objective multi-item five dimensional transportation problem: A case study of milk transportation problem*, Appl. Soft Comput. **178** (2025), article no. 113237, DOI: 10.1016/j.asoc.2025.113237 (34 pages).
- N. K. Joshi and J. M. Dhodiya, *Intelligent Many-objective portfolio optimization using hybrid deep learning and evolutionary algorithm approach for advanced decision making*, Comput. Ind. Eng. **205** (2025), article no. 111159, DOI: 10.1016/j.cie.2025.111159 (41 pages).
- A. Todkar and J. Dhodiya, *Uncertain multi-objective multi-route shortest path problem by robust enhanced non-dominated sorting genetic algorithms: Application to emergency medical services*, J. Ind. Manag. Optim. **20** (2024), no. 11, 3453–3485, DOI: 10.3934/jimo.2024061.
- A. S. Todkar and J. M. Dhodiya, *Enhanced non-dominated sorting genetic algorithms for uncertain multi-objective shortest path problem by: Application to fire prevention services*, Int. J. Uncertain. Fuzziness Knowl.-Based Syst. **32** (2024), no. 8, 1215–1244, DOI: 10.1142/S0218488524500302.
- A. S. Todkar and J. M. Dhodiya, *Aspiration level-based non-dominated sorting genetic algorithm II & III to solve fuzzy multi-objective shortest path problem*, Yugosl. J. Oper. Res. **35** (2025), no. 1, 135–162, DOI: 10.2298/YJOR230218015T.
- S. B. Bhoi and J. M. Dhodiya, *Multi-objective faculty course assignment problem based on the double parametric form of fuzzy preferences*, Oper. Res. Decis. **34** (2024), no.2, 1–16, DOI: 10.37190/ord240201.
- S. B. Bhoi and J. M. Dhodiya, *Double parametric scheme based multi-objective university course scheduling problem by fuzzy programming technique with exponential membership function*, Opsearch (2025), DOI: 10.1007/s12597-025-00931-z (27 pages).
- A. R. Tailor and J. M. Dhodiya, *Assignment problem with multiple objectives and its solution using GA Variants*, J. Emerg. Technol. Innov. Res. **11** (2024), no. 9, b686–b692, available at <https://www.jetir.org/view?paper=JETIR2409184>.
- M. Kumar and R. K. Jana, *Analysis of dust ion acoustic soliton and shock waves of damped kDV–Burgers' equation in superthermal plasmas: Adomian decomposition approach*, Braz. J. Phys. **54** (2024), article no. 98, DOI: 10.1007/s13538-024-01468-0 (14 pages).
- R. Mondal and R. K. Jana, *A supplier–Stackleberg game model under two levels of trade credit considering default risk*, Int. J. Supply Oper. Manage. **11** (2024), no. 3, 334–350, DOI: 10.22034/ij-som.2024.110360.3077.
- J. B. Gajera and R. K. Jana, *Some inequalities for generalized  $(q, k)$  Mittag–Leffler function*, Math. Notes **116** (2024), 960–968, DOI: 10.1134/S0001434624110087.
- R. Mondal and R. K. Jana, *A model for fresh produce with inflation induced dynamic demand under dynamic trade credit policy in imprecise environments*, Sādhanā **49** (2024), article no. 206, DOI: 10.1007/s12046-024-02530-y (17 pages).
- J. B. Gajera and R. K. Jana, *On the Turán type inequalities and  $k$ -analogue of some special functions*, J. Indian Math. Soc. **91** (2024), no. 1–2, 145–154, DOI: 10.18311/jims/2024/30476.
- K. Kushwaha, R. K. Jana, and P. Dutta, *Multi-objective multi-item solid transportation problem using penalty-based NSGA-II: a case study on fertilizer transportation in India*, Sādhanā **50** (2025), article no. 67, DOI: 10.1007/s12046-025-02673-6 (22 pages).

- J. B. Gajera and R. K. Jana, *Some inequalities for fractional integrals via  $(\eta, l)$ -convex function*, Math. Student **93** (2024), no. 3–4, 147–160.
- K. M. Bhammar and R. K. Jana, *Extended analogues of gamma and beta matrix functions*, Commun. Korean Math. Soc., **40** (2025), no. 2, 315–332, DOI: 10.4134/CKMS.c240170.
- M. Kumar and R. K. Jana, *Homotopy analysis method for Burgers' equation: Application of gradient descent approach*, Proc. Nat. Acad. Sci. India Sect. A **95** (2025), 221–227, DOI: 10.1007/s40010-025-00922-1.
- A. Mondal, R. K. Jana, and D. K. Jana, *Pricing and collection decisions of a closed-loop supply chain under dual modes using fuzzy game theoretic approach*, Process Integr. Optim. Sustain. (2025), DOI: 10.1007/s41660-025-00527-6.
- Akshey and T. R. Singh, *Approximate analytical solution of the time-fractional reaction-diffusion-convection equation using Aboodh transform iterative method*, Iran. J. Sci. **49** (2025), 757–769, DOI: 10.1007/s40995-024-01739-0.
- H. Jani and T. R. Singh, *A study of water infiltration in unsaturated soils by Aboodh transform homotopy perturbation method*, Int. J. Appl. Comput. Math. **11** (2025), article no. 52, DOI: 10.1007/s40819-025-01868-z (12 pages).
- H. Jani and T. Singh, *Solution of fractional order Schrödinger equation by using Aboodh transform homotopy perturbation method*, J. Fract. Calc. Appl. **16** (2025), no. 1, 1–13, DOI: 10.21608/jfca.2025.303433.1116
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### Conference Publications (Proceedings)

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- R. Meher, L. Verma, and P. P. Sartanpara, *Study on effects of uncertain volume fraction on hybrid*, in: A. K. Pandey et al. (Eds.), Applications of Hybrid Nanofluids in Science and Engineering (CRC Press), chap. 15, 2025, DOI: 10.1201/9781003595786-15 (33 pages).
- N. Sahu and S. R. Yadav, *Fluid flow through porous medium including dynamic capillary pressure: a review with mathematical aspects*, in: B. K. Jha (Eds.), Computational Modeling and Sustainable Energy, Innovations in Sustainable Technologies and Computing (Springer), pp. 431–443, 2025, DOI: 10.1007/978-981-97-6794-6\_27.

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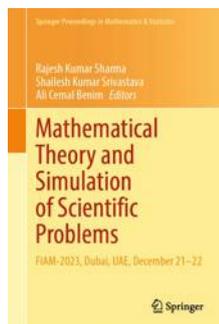
## Conference Paper Presentations

- R. K. Meena and S. Kumar, *A comprehensive study of the multi-dimensional time-fractional Korteweg–de Vries equation using the residual power series method*, presented at the **2nd International Conference on Recent Advances in Fluid Mechanics and Nanoelectronics (ICRAFNM-2024)** organized by Manipal University, Jaipur, India, during July 10–12, 2024.
- S. Kumar, *Numerical simulation of lung tissue freezing during cryosurgery using TPL bioheat model*, presented at the **Fourth International Conference on Mathematics and Statistics** organized by American University of Sharjah, Sharjah, UAE, during February 20–22, 2025.
- R. S. Prasad and S. Kumar, *A numerical study of cell heterogeneity in brain tumor growth*, presented at the **90th Annual Conference of Indian Mathematical Society – An International Meet** organized by Dr. Vishwanath Karad MIT World Peace University, Pune, India, during December 23–26, 2024.
- N. K. Joshi and J. M. Dhodiya, *Intelligent multi-objective index trading strategies in the stock market: a deep learning and fuzzy logic approach with evolutionary optimization*, presented at the **Fifth International Conference on Advanced Engineering Optimization Through Intelligent Techniques (AEOTIT)**, organized by Sardar Vallabhbhai National Institute of Technology, Surat, India, during November 28–30, 2024.
- N. K. Joshi and J. M. Dhodiya, *Advanced multi-objective portfolio optimization using hybrid deep learning and evolutionary algorithms*, presented at the **MTMI International Conference on Emerging Issues in Business, Technology, and Applied Science 2024**, organized by MTMI, Dubai in collaboration with DBMA, University of Maryland Eastern Shore, USA, and Frostburg State University, USA, during December 20–22, 2024.
- E. Jain and J. M. Dhodiya, *Fuzzy multi-choice multi-objective multi-item five dimensional transportation problem and its solution by variants of genetic algorithm*, presented at the **Fifth International Conference on Advanced Engineering Optimization Through Intelligent Techniques (AEOTIT)**, organized by Sardar Vallabhbhai National Institute of Technology, Surat, India, during November 28–30, 2024.
- E. Jain and J. M. Dhodiya, *Uncertain multi-objective multi-item five-dimensional transportation problem and its solution by variants of non-dominated sorting genetic algorithms*, presented at the **International Conference on Business Analytics and Management Science (BAMS - 2024)** organized by Indian Institute of Technology Bombay, Mumbai, India during December 12–14, 2024.
- E. Jain and J. M. Dhodiya, *Variants of genetic algorithm to solve fuzzy multi-objective multi-item five-dimensional transportation problem*, presented at the **MTMI International Conference on Emerging Issues in Business, Technology, and Applied Science 2024**, organized by MTMI, Dubai in collaboration with DBMA, University of Maryland Eastern Shore, USA, and Frostburg State University, USA, during December 20–22, 2024.
- N. K. Joshi and J. M. Dhodiya, *Intelligent Deep Forecasting and Multi-Objective Evolutionary Optimization for Robust Index Option Strategies*, presented at the **International Conference on Operations Research and Decision Science (ICORDS 2025)**, organized by Centre for Advanced Research in Applied Mathematics and Statistics (CARAMS), Manipal Academy of Higher Education (MAHE), Manipal, India, during June 5–7, 2025.
- E. Jain and J. M. Dhodiya, *Fuzzy Multi-objective Multi-item Five-Dimensional Transportation Problem and Its Solutions by Variants of Genetic Algorithm*, presented at the **International Conference on Operations Research and Decision Science (ICORDS 2025)**, organized by Centre for Advanced Research in Applied Mathematics and Statistics (CARAMS), Manipal Academy of Higher Education (MAHE), Manipal, India, during June 5–7, 2025.
- K. Kushwaha and R. K. Jana, *A real life fertilizer transportation problem using penalty based NSGA-II and entropy weight based TOPSIS method*, presented at the **2nd International Conference on Recent Advances in Applied Mathematics (RAAM 2024)** organized by Indian Institute of Technology (B.H.U.), Varanasi, India, during July 03–05, 2024.

- K. M. Bhammar and R. K. Jana, *A note on extended gamma and beta matrix functions*, presented at the **International Conference on Special Functions & Applications (ICSFA-2024)** organized by Vivekananda Global University, Jaipur, India, during November 28–30, 2024.
- K. Kushwaha and R. K. Jana, *CMO-OOA: A new constrained multi-objective osprey optimization algorithm*, presented at the **International Conference on Emerging Trends in Business Analytics and Management Sciences 2024 (BAMS-ORSI 2024)** organized by Indian Institute of Technology Bombay, Mumbai, India, during December 12–14, 2024.
- K. Kushwaha and R. K. Jana, *A multi-objective chaotic walrus optimization algorithm*, presented at the **13th International Conference on Soft Computing for Problem Solving (SocPros 2025): Artificial Intelligence for Viksit Bharat** organized by Indian Institute of Technology Roorkee, Roorkee, India, during February 24–26, 2025.
- N. Chaudhary and T. R. Singh, *Study on Fractional Mathematical Model of Tumor Immune Interaction Using Caputo Fractional Derivative*, presented at **International Conference on Applied Mathematical Sciences for Emerging Technologies-2024 (ICMSET-2024)**, jointly organized by Dhanalakshmi Srinivasan University, Tiruchirappalli, India, and Siirt University, Siirt, Turkey, during December 13–14, 2024.
- N. Chaudhary and T. R. Singh, *Study on Coffee Berry Diseases Model with Fractional Approach*, presented at the **90th Annual Conference of Indian Mathematical Society: An International Meet**, organized by Dr. Vishwanath Karad MIT World Peace University, Pune, India, during December 23–26, 2024.
- N. Chaudhary and T. R. Singh, *Mathematical Model of Dynamics of Coffee Berry Disease Using Fractional Approach*, presented at the **6th National Conference on Recent Advancement in Physical Sciences (NCRAPS2025)**, jointly organized by DIT University, Dehradun, India and NIT Uttarakhand, Srinagar, India in association with MRSI Delhi Chapter and ISDT DRDO, during February 14–15, 2025.
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- A. Maurya and R. K. Maurya, *Analyzing progressive censoring in  $k$  out of  $n$  load sharing systems under exponential distribution*, presented at the **International Indian Statistical Association (IISA) 2024 Conference** organized by Cochin University of Science and Technology, Kochi, India, during December 27–31, 2024.
- G. S. Charan and S. S. Sanga, *Analysis of priority retrial queue system with delayed vacations, server breakdown, and balking under fuzzy conditions*, presented at the **International Conference on Business Analytics and Management Science (BAMS - 2024)** organized by Indian Institute of Technology Bombay, Mumbai, India, during December 12–14, 2024.

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- P. Patel and S. R. Yadav, *Physics-informed neural networks simulation for various types of the Fisher equations*, presented at the **Meeting on Analysis, Dimensions, and PDEs** organized by Indian Institute of Information Technology Allahabad, Prayagraj, India, during July 27, 2024.
- M. Bodar and S. Gupta, *Water wave interaction with a horizontal porous plate in a two-layer fluid*, presented at the **90th Annual Conference of Indian Mathematical Society: An International Meet**, organized by Dr. Vishwanath Karad MIT World Peace University, Pune, India, during December 23–26, 2024.
- T. Gera, *The Hopkins–Levitzki Theorem and New Variants of Chain Conditions*, presented at **Mathematics Day 2024**, organized by Indian Institute of Technology Jammu, Jagti, India, on December 9, 2024.
- T. Gera, *Modules with Descending Chain Conditions on Principal Ideals*, presented at the **39th Annual Conference of Ramanujan Mathematical Society**, organized by Christ University, Bangalore, India, during December 27–29, 2024.

## Edited Book



R. K. Sharma, S. K. Srivastava, and A. C. Benim, *Mathematical Theory and Simulation of Scientific Problems (FIAM 2023)*, Springer Proceedings in Mathematics & Statistics, Vol. 487, 2025, DOI: 10.1007/978-981-96-2579-6.

# Departmental Activities

## Ph.D Orientation Program Autumn 2024

The Ph.D. Orientation Program of the Department of Mathematics, SVNIT, Surat was successfully conducted to welcome and introduce the new batch of doctoral students admitted for the autumn semester A.Y. 2024-25. The event was organized with enthusiasm and served as an excellent platform for the students to familiarize themselves with the department, faculty, and academic environment. The program commenced with a warm welcome by the host, Ms. Ekata Jain, a research scholar in the department. She expressed her delight in hosting the occasion and congratulated the new Ph.D. students on embarking on their academic journey. She highlighted the significance of this milestone and the opportunities it offers for innovation, discovery, and academic excellence. The Head of the Department, Dr. Jayesh M. Dhodiya, was invited to deliver the welcome address. He emphasized the importance of research, dedication, and collaboration in achieving success during the Ph.D. journey. His motivational words inspired the attendees and set the welcome tone for the event. The new Ph.D. scholars were individually introduced to the audience. They came on stage to share a brief introduction, including their educational background and research interests.



The following students were welcomed into the department:

- Palika Prabhakar
- Foram Vinchhi
- Kruti Vayeda
- Divyanshu Dutt
- Princekumar Patel
- Muskaan Saini
- Dattaviben Padhiyar
- Vishwa Bhatt
- Sanjul Mishra
- Gannamaneni Sai Charan
- Bhavika Shinde
- Theophilus Gera

Their introductions provided an insight into the diverse backgrounds and expertise they bring to the department, fostering a sense of community among peers. The esteemed faculty members of the department, including Prof. A. K. Shukla, Prof. V. H. Pradhan, and Prof. Neeru Adlakhia, addressed the students. They shared valuable advice and words of encouragement, emphasizing the importance of perseverance and intellectual curiosity in research. Dr. Twinkle R. Singh, Ph.D. Coordinator, also shared insights on navigating the challenges of a doctoral program and the resources available in the department.

A video presentation showcased the department's vibrant academic culture and extracurricular activities. The video included highlights from events such as Teachers' Day, National Mathematics Day, and the International Day of Mathematics, along with glimpses of creative pursuits like Rangoli competitions.

This presentation offered the new students a glimpse of the department's dynamic environment. The program concluded with a vote of thanks delivered by Dr. Twinkle R. Singh. She expressed gratitude to the faculty members, organizing team, and attendees for making the event a success. She encouraged the new Ph.D. scholars to actively engage in the department's activities and strive for academic excellence.

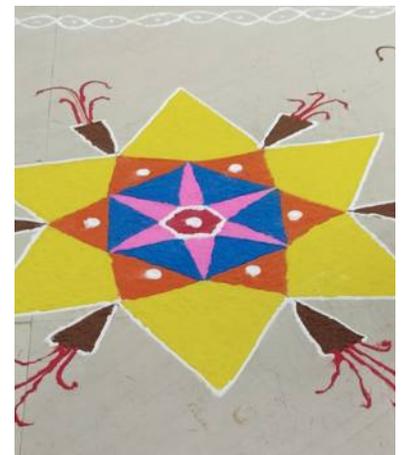
To commemorate the occasion, a group photograph was taken with all the new Ph.D. students, faculty members, and staff. The Ph.D. Orientation Program was a resounding success, marking the beginning of an exciting chapter for the new scholars. It fostered a sense of belonging and motivated the students to achieve their academic aspirations under the guidance of the esteemed faculty.

## Rangoli Competition 2024

Rangoli competition is a creative and vibrant event that celebrates the traditional Indian art form of rangoli. Rangoli is a decorative art form in which intricate and colorful patterns are created on the ground using various materials such as colored powders, flower petals, rice, or other decorative elements. It is a popular form of expression during festivals and special occasions in India. The designs range from geometric shapes to elaborate motifs inspired by nature, religious symbols, or cultural themes. Rangoli not only adds aesthetic beauty to celebrations but also holds cultural significance, symbolizing good luck, hospitality, and the welcoming of guests into one's home.



The Department of Mathematics, SVNIT joyously commemorated the Diwali festival by organizing a vibrant Rangoli Competition. This event served as a creative platform for students and faculty members to showcase their artistic talents through the intricate and colorful designs of Rangoli, a traditional Indian art form. Participants expressed their enthusiasm and cultural spirit, contributing to the festive atmosphere on campus. The competition not only added a touch of cultural richness to the Diwali celebrations but also fostered a sense of community and collaboration within the Mathematics department at SVNIT. The Rangoli Competition witnessed enthusiastic participation from a total of seven teams, featuring both M.Sc. (Master of Science) students and Ph.D. students. Each team showcased its creativity and artistic flair by crafting beautiful and intricate rangolis, contributing to the vibrant display of colors and patterns. The event not only provided a platform for students at different academic levels to come together but also highlighted the diverse talents within the academic community. The collaboration between M.Sc. and Ph.D. students added a dynamic and inclusive dimension to the overall celebration of the Diwali festival.





## Teacher's Day Celebrations and Pramiti 2024 Release

The Department of Mathematics at SVNIT Surat organized a vibrant Teachers' Day celebration on September 5, 2024, to honor and express gratitude toward the dedicated faculty members. The event was filled with heartfelt moments, inspiring talks, and lively performances, making it a memorable occasion for all. The celebration began with a warm welcome by the student hosts, who expressed their heartfelt appreciation for the faculty's unwavering dedication to imparting knowledge and guiding students. The faculty members were greeted with flowers and mementos as a gesture of gratitude and respect. The students conveyed their heartfelt thanks for the invaluable contributions of the teachers in shaping their academic and personal growth. Prominent faculty members addressed the gathering, sharing their reflections on the significance of Teachers' Day. They encouraged students to remain curious and resilient in their pursuit of knowledge. The talks were insightful and resonated deeply with everyone present.



A special cake-cutting ceremony was organized to commemorate the occasion. Faculty members and students jointly participated, symbolizing the bond of mutual respect and admiration. The much-awaited release of Pramiti 2024, the department's annual magazine, took place. The magazine showcases the creative and academic achievements of the students and faculty members. The Head of the Department, Dr. Jayesh Dhodiya, along with other faculty members, shared insights into the making of Pramiti 2024. They appreciated the efforts of the editorial team and encouraged students to continue contributing to such creative endeavors.



Representatives of the Students' Committee shared their experiences of organizing the event and expressed their heartfelt gratitude toward the faculty for their constant support and mentorship. Students showcased their talents through captivating performances dedicated to their beloved teachers. The performances were well-received and added a touch of joy to the celebration. The event concluded with a vote of thanks delivered by a student representative. Gratitude was expressed to the faculty, students, and organizing team for their contributions to making the event a success. The celebration came to an end, leaving everyone with cherished memories and a renewed sense of respect and admiration for the teaching profession. The Teachers' Day celebration was a heartwarming tribute to the faculty of the Department of Mathematics. It strengthened the bond between students and teachers and served as a reminder of the pivotal role educators play in shaping the future. The event was a grand success, filled with inspiration, joy, and appreciation.

## National Mathematics Week 2024

The Department of Applied Mathematics and Humanities, SVNIT Surat, celebrated National Mathematics Week 2024 during December 16–23, 2024. The aim was to promote awareness of the importance of mathematics in everyday life among students and the public through various activities and expert sessions.

### I) Expert Lecture

Distinguished speakers graced the week, sharing profound knowledge and fostering intellectual curiosity through a series of hybrid lectures accessible both online and in person:

- Retd. Prof. P. H. Bhatwala (VNSGU): Kicked off the expert talks on December 18th, sharing valuable perspectives from his extensive experience.



- Retd. Prof. M. N. Mehta (SVNIT): Delivered an engaging lecture on December 19th, drawing upon his long association with SVNIT.



- Dr. Kaushal Patel (VNSGU): Presented insights on December 20th, contributing to the diverse range of topics covered during the week.



- Prof. S. G. Dani (UM-DAE CEBS): Connected virtually on December 21st to deliver an online talk, broadening the reach of the lecture series.
- **Shri Srinivasa Ramanujan Birthday Celebrations** (December 22nd): A special session marked Ramanujan's birthday, featuring an insightful talk by Prof. D. C. Joshi (VNSGU) dedicated to the mathematical genius.



- **Valedictory Session Speakers** (December 23rd): The week concluded with wisdom shared by Retd. Prof. A. P. Verma (SVNIT), Retd. Prof. V. D. Pathak (MSU Baroda), and Retd. Prof. S. Rama Mohan (MSU Baroda), bringing the celebrations to a fitting close.

## II) PhD Offline Events

PhD scholars immersed themselves in a variety of stimulating offline activities held within the Department, fostering learning, creativity, and camaraderie.

- **Movie Screening:** The week began with a screening of the biographical drama “The Imitation Game,” highlighting Alan Turing’s pivotal role in code-breaking during World War II, organized by Mr. Hardik Radadiya.
- **Puzzle Solving** (December 17th): Scholars sharpened their analytical and problem-solving abilities in an engaging session dedicated to tackling intriguing puzzles, led by Mr. Shubam Gaoli.



- **Paper Presentation** (Dec 18th, 19th, 20th): Students presented their research, showcasing mathematical skills and creativity. Presentations were evaluated on clarity, originality, depth, and delivery, with Aman Prakash securing first place, Theophilus Gera second, and Nidhi third. The event, coordinated by Mr. Nikunj Joshi K., highlighted the participants’ dedication.
- **Video Clipping** (December 18th): This event encouraged scholars to create videos focusing on mathematical concepts, real-world applications, or entertaining math tricks. Led by Mr. Bhavin Rachhadiya, the winning entry came from Joshi Nikunj K.
- **Mathematical Poem** (December 19th): Blending artistry and analysis, this session invited scholars to express mathematical ideas through poetry, under the guidance of Mr. Dave Pinakin.
- **Communication Gap** (December 19th): A fun, interactive game tested participants’ ability to convey information effectively despite challenges and restrictions, emphasizing the importance of clear communication. The event was led by Ms. Kiran Dhirawat, with the team of Prince, Foram, Hartik, and Darshak emerging as winners.
- **Treasure Hunt** (December 20th): Scholars embarked on an exciting Treasure Hunt around the department, solving clues and working together in an adventurous quest organized by Ms. Nidhi Patel.



- **Poster Presentation** (December 23rd): Scholars demonstrated their ability to visually communicate complex mathematical concepts and research findings effectively through posters. Coordinated by Mr. Hardik Radadiya, the winners were Vijay Panchal & Muskaan Saini (Group 1) and Palika Prabhakar.
- **Musical Chairs** (December 23rd): The PhD events concluded with a light-hearted game of Musical Chairs, providing a fun social interaction led by Mr. Sanjay Gosiya.

### III) MSc Online Events

MSc students actively participated in a dynamic suite of online events, showcasing their skills and connecting virtually.

- **Graph Artistry:** A creative challenge, led by Ms. Ruchita Balgari, where participants submitted visually appealing designs (digital or hand-drawn) accompanied by explanations of the underlying mathematical concepts like fractals or symmetry. Originality was key, with AI-generated designs prohibited. Submissions were due by Dec 20th.
- **Quick Pick** (Dec 18th): This unconventional quiz, headed by Mr. Vaibhav Suvagiya, required participants to quickly choose the incorrect option from multiple-choice questions within a tight time limit (30-60 seconds per question). Speed and accuracy in identifying the wrong answer were rewarded.
- **Memefy Math:** Fusing humor and mathematics, this competition invited students to craft original, math-themed memes by Dec 20th. Entries, led by Mr. Manish Choudhary, were judged on humor, mathematical accuracy, creativity, and visual appeal.
- **SherLOCK** (Dec 19th): Teams of up to three participants, led by Ms. Sukhda Baruna, embarked on a digital quest, unlocking a sequence of 7 password-protected PDFs by deciphering clues within each document to find the next password. The first team to submit all passwords via a final Google Form won.
- **Math Maze** (Dec 19th): Headed by Mr. Varun Samdani, this individual challenge involved filling a numerical crossword puzzle. Participants used mathematical hints (equations, word problems, figures) to find positive, negative, or decimal number answers, with points awarded for accuracy and closeness.
- **Math Code Clash** (Dec 20th): A 3-hour competitive programming battle held via HackerRank. Teams of up to two members, led by Mr. Sanjay Kumar, tackled 5 coding problems, aiming for the highest score in the shortest time. Time-efficient solutions and originality were crucial.
- **Integration Bee** (Dec 20th): Led by Mr. Amritanshu Pandey, this competition tested participants' calculus prowess. Individuals had 40 minutes to solve a set of definite and indefinite integrals, with accuracy being the primary judging criterion.
- **Hex Tournament** (Dec 20th): Strategic minds clashed in this online two-player board game hosted on playok.com. Headed by Mr. Bhavik Dodda, players aimed to connect opposite sides of a hexagonal board first, with losers being eliminated.
- **Flowing in X & Y** (Dec 21st): This two-round event, led by Mr. Bhavik Dodda, challenged teams/individuals to find the mathematical equations that generated given visual patterns or graphs. Participants used software tools, with Round 1 focusing on approximation and Round 2 being a speed challenge for the top teams.
- **Math Up** (Dec 21st): An innovative two-round startup pitch competition, headed by Mr. Adarsh Tiwari. Randomly assigned teams of three presented math-related startup ideas aimed at societal betterment, judged on purpose, math relevance, uniqueness, and pitching skills. Promising ideas had the potential for departmental support.



## One-Week Workshop on Interdisciplinary Computing

The One-Week Workshop on Interdisciplinary Computing in Basic and Applied Sciences, held from December 9th to 15th, 2024, was a joint initiative by MathTech Thinking Foundation, Fazilka, Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat, and Sardar Patel University, Vallabh Vidyanagar. The workshop aimed to bridge the gap between computing and diverse scientific domains by equipping participants with skills in Python programming and open-source tools for research and interdisciplinary applications. The event attracted over 100 participants from 13 countries, fostering a dynamic and collaborative learning environment.

## Indian Mathematical Society (IMS) Sponsored Lecture

The Indian Mathematical Society (IMS), a long-standing scientific organization in India founded in 1907, facilitates the dissemination of mathematical knowledge through its Sponsored Lectures scheme. Following communication between the IMS General Secretary and Prof. A. K. Shukla, a sponsored lecture was organized at SVNIT, Surat. Prof. Jitendra Kumar from IIT Ropar graciously agreed to deliver the talk on November 8th, 2024.

The lecture, titled "Understanding Errors and Sensitivity in Scientific Computing," took place in the Department of Mathematics at SVNIT. Dr. Ranjan Kumar Jana introduced Prof. Kumar, who was then welcomed by the Head of the Department, Dr. J. M. Dhodiya. Prof. Kumar's presentation covered fundamental to advanced concepts in scientific computing, including problem conditioning, algorithm stability, and condition numbers. The engaging question-and-answer session indicated the audience's deep interest. After the talk, Dr. Dhodiya presented a certificate to Prof. Kumar, and Prof. A. K. Shukla presented an honorarium of Rs. 2000 on behalf of the IMS. The event saw enthusiastic participation from approximately 60 students and 12 faculty members.



## RTES-2025: International Conference

Dr Shailesh Kumar Srivastava organized an "International Conference on Recent Trends in Engineering and Sciences (RTES-2025)" in the capacity of Chairman, at Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat, Gujarat-395007, India, during Feb 14-15, 2025, in collaboration with the Centre for Continuing Education (CCE), SVNIT Surat, and Hindi cell, SVNIT Surat.

## DST-FIST Lab Inauguration

DST-FIST Lab Inaugurated at SVNIT Surat's Mathematics Department, bolstering research infrastructure and fostering innovation in mathematical sciences. This significant development, funded by the Department of Science and Technology, will empower advanced research and academic excellence in the field.



## Report on 2<sup>nd</sup> Industrial Conclave of Mathematics and Computing (IMCI 4.0)

The Department of Mathematics, Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat organized the 2nd Industrial Conclave of Mathematics and Computing (IMCI 4.0) on May 11, 2025. The conclave, themed 'Intelligent Mathematics and Computation for Industry 4.0', aimed to bridge the gap between academia and industry by showcasing the vital role of mathematical sciences and computation in modern technological advancements. The event featured several distinguished speakers from leading industries and research institutions who shared their insights and experiences with the participants. The day commenced with an inaugural ceremony that included the traditional lamp lighting followed by inspiring speeches from Prof. V. H. Pradhan, Professor of the Department of Mathematics, and Dr. J. M. Dhodiya, the event organizer and Head of the Department.



*Welcoming Prof. D. G. Kuberkar*



*Welcoming Prof. Dr. J. N. Patel, I/c Director, SVNIT, Surat*



*Welcome Address by Dr. Jayesh M. Dhodiya, Head, Department of Mathematics, SVNIT, Surat*



*Address by Prof. V. H. Pradhan, Professor, Department of Mathematics, SVNIT, Surat*



Address by Prof. Dr. J. N. Patel, Guest of Honor



Address by Prof. D. G. Kuberkar, Chief Guest

A tea break was held at 11:15 AM, allowing participants to interact and network informally after the opening session.

### **Dr. Chintan Naik – Founder & CTO at Pixeta App Lab**

Dr. Chintan Naik opened the technical sessions with a compelling and insightful discussion on the vital intersection of mathematics and modern technology, particularly in the domains of mobile and web applications. Drawing extensively from his entrepreneurial journey at Pixeta App Lab, he elaborated on how foundational mathematical concepts like optimization algorithms, graph theory, statistical inference, and predictive modeling form the backbone of intelligent digital systems. He discussed practical examples of how these concepts are applied to enhance app performance, streamline backend processes, and personalize user experiences at scale. Dr. Naik emphasized the importance of data-driven decision-making and how mathematical analysis enables tech developers to anticipate user behavior, manage server load efficiently, and build robust, scalable solutions. He also touched upon the growing demand for mathematically literate professionals in the tech startup ecosystem, where innovation and analytical rigor go hand in hand. His engaging presentation not only illustrated the real-world relevance of academic mathematics but also inspired many students to consider entrepreneurship as a dynamic and impactful way to translate theoretical knowledge into tangible societal solutions.



Lecture by Dr. Chintan Naik

### **Dr. Viraj M. Loliyana – CEO, FAMS Design Solutions Pvt. Ltd., Mumbai**

Dr. Viraj M. Loliyana delivered a technically rich and engaging session on the pivotal role of mathematical modeling in the field of engineering design and simulation. He began by explaining how mathematical frameworks form the foundation of modern design processes, particularly in complex engineering environments where accuracy and efficiency are paramount. He provided a detailed overview of tools such as the Finite Element Method (FEM), numerical analysis techniques, and multi-objective optimization strategies, emphasizing their significance in improving design accuracy, reducing physical prototyping costs, and accelerating development timelines. Through well-chosen case studies from his firm, FAMS Design Solutions, he illustrated how these mathematical techniques have been successfully deployed in industries like automotive, aerospace, and consumer electronics to achieve design automation and intelligent prototyping. Dr. Loliyana also discussed the evolution of computer-aided engineering (CAE) and how mathematics has enabled the creation of digital twins and virtual testing environments. His presentation highlighted the seamless integration of theoretical mathematics with software platforms to deliver reliable, data-driven engineering outcomes. By blending real-world industrial challenges with academic rigor, Dr. Loliyana's talk offered students and professionals a clear vision of how mathematical thinking drives innovation in modern engineering design.



*Lecture by Dr. Viraj M. Loliyana*

### **Mr. Naresh Teli – Managing Director, Hastee Smart Retail Pvt. Ltd., Surat**

Mr. Naresh Teli offered a practical and industry-grounded perspective on how mathematics is revolutionizing the modern retail landscape. Through his experience as the Managing Director of Hastee Smart Retail Pvt. Ltd., he illustrated how the integration of mathematical concepts such as statistical analysis, linear programming, and predictive modeling is reshaping various facets of the retail industry—from customer engagement and inventory management to dynamic pricing and supply chain optimization. He elaborated on how data analytics is used to understand consumer behavior, forecast demand trends, and personalize marketing strategies, thereby increasing customer satisfaction and sales conversion rates. Mr. Teli also highlighted the role of artificial intelligence (AI) and machine learning (ML), emphasizing that these advanced technologies are built upon a foundation of mathematical algorithms such as decision trees, clustering, regression, and time-series analysis. He discussed how smart retail systems now rely on real-time data and mathematical optimization to make instantaneous decisions that were traditionally reliant on manual judgment. His talk underscored the growing importance of mathematically informed business strategies in creating agile, customer-centric retail models. By bridging theoretical concepts with hands-on application, Mr. Teli’s session served as a valuable example of how mathematics can drive innovation and operational excellence in an industry as dynamic as retail.



*Lecture by Mr. Naresh Teli*

### **Dr. Subha Agnihotri – Senior Software Developer, HCL, Noida**

Dr. Subha Agnihotri delivered a thought-provoking session on the indispensable role of mathematics in ensuring the quality, security, and correctness of modern software systems. With her extensive background as a senior software developer at HCL, she explained how logical reasoning, discrete mathematics, and algorithmic frameworks form the theoretical backbone of software testing and verification. She introduced the audience to formal methods—a class of mathematically rigorous techniques used to specify, develop, and verify software and hardware systems. Dr. Agnihotri elaborated on concepts such as model checking, temporal logic, and theorem proving, demonstrating how these are applied to detect bugs and ensure system consistency, especially in real-time and safety-critical applications like avionics, medical devices, and banking software. She also emphasized the growing importance of correctness-by-construction approaches in software engineering, which leverage mathematics to build systems that are verifiably correct from the outset. Through real-world examples and case studies, she showed how mathematical modeling not only improves software reliability but also reduces costs associated with post-deployment errors. Her session reinforced the message that a strong mathematical foundation is essential for building robust, scalable, and secure software in today’s complex technological ecosystem.

## Dr. Ramit Das – Formal Verification Engineer, Intel India, Bangalore

Dr. Ramit Das delivered a technically rigorous and enlightening session on the critical role of formal verification in the semiconductor industry. As a Formal Verification Engineer at Intel India, he provided a deep dive into how advanced mathematical methods are applied to ensure the correctness and reliability of hardware designs long before they reach the fabrication stage. He explained that in the development of complex digital circuits—such as microprocessors, memory controllers, and SoCs (System-on-Chip)—even a minor logical flaw can lead to catastrophic system failure or multi-million-dollar losses. To address this, formal verification employs precise mathematical models, drawing from areas such as propositional logic, automata theory, and temporal logic, to rigorously verify that a hardware design adheres to its specification under all possible conditions.

Dr. Das discussed tools like model checkers and SAT/SMT solvers, and demonstrated their use in detecting subtle design bugs that conventional simulation methods might miss. He also highlighted how formal methods contribute to reducing verification time, improving design quality, and lowering overall development costs in the competitive chip manufacturing industry. Through real-life industrial case studies and technical demonstrations, he conveyed the growing demand for mathematically skilled professionals in the hardware verification domain. His talk made it abundantly clear that mathematics is not just a theoretical pursuit but a practical necessity in ensuring the reliability of the digital infrastructure that powers modern technology.



*Lecture by Dr. Ramit Das*

## Mr. Sahil Unagar – Software Engineer 2, Google, Bangalore

Mr. Sahil Unagar delivered a captivating and forward-looking session on how mathematics serves as the backbone of large-scale innovation at Google. Drawing on his experience as a Software Engineer at one of the world's most influential tech companies, he provided an inside view of how complex mathematical concepts are seamlessly integrated into the development of scalable systems that billions of users rely on daily. He elaborated on the use of graph theory in understanding and optimizing networks of data, probability theory in powering ranking algorithms and spam detection, and linear algebra in enabling machine learning models that drive personalized recommendations and targeted advertising. Mr. Unagar also spoke about the role of matrix factorization and eigenvalue computation in dimensionality reduction, which is key to handling massive datasets efficiently. He highlighted the iterative nature of algorithmic design, where mathematical accuracy is crucial not only for performance but also for ethical considerations like fairness, transparency, and bias mitigation. His session emphasized how mathematical modeling is indispensable in addressing challenges related to latency, scalability, and relevance in services such as Google Search, Maps, and YouTube. By illustrating real-world applications and the global impact of algorithm-driven decision-making, Mr. Unagar inspired students to appreciate the practical power of mathematics in solving some of the most complex engineering problems in the digital age.

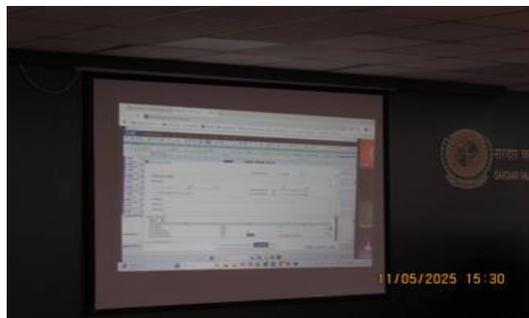


*Lecture by Mr. Sahil Unagar*

### **Dr. Surbhi Tilva – Data Scientist, TATA IQ, Bangalore**

Dr. Surbhi Tilva provided an industry-focused perspective on the application of data science in business analytics, emphasizing the critical role of techniques like machine learning, clustering, and regression analysis in extracting meaningful insights from vast and complex datasets. She explained how these methods enable businesses to uncover hidden patterns, segment customers effectively, and make accurate predictions about future trends and behaviors.

Through real-world examples, Dr. Tilva demonstrated how mathematical models and data-driven approaches have significantly influenced strategic decision-making, helping organizations better understand customer behavior, optimize product development, and design targeted marketing strategies. Her session highlighted how leveraging these data science techniques allows companies to transform raw data into actionable insights, driving innovation, improving customer engagement, and gaining a competitive edge in today's data-driven business environment.



*Lecture by Dr. Surbhi Tilva*

### **Mr. Divyang Gor – Automation Engineer (Data Science), AM/NS, Surat**

Mr. Divyang Gor presented an insightful discussion on the fusion of data science with industrial automation, emphasizing how this integration is revolutionizing manufacturing processes. His presentation delved into the use of advanced statistical models, optimization techniques, and machine learning algorithms to enhance key industrial functions such as predictive maintenance and quality control. Predictive maintenance, as he explained, leverages data from sensors and machines to forecast potential equipment failures well before they happen, thereby minimizing unexpected downtime and costly repairs. In terms of quality control, Mr. Gor illustrated how data-driven models enable real-time monitoring and early detection of defects, ensuring that products consistently meet high-quality standards. He highlighted how these smart frameworks, powered by continuous data collection and analysis, are increasingly replacing traditional manual and reactive systems, resulting in more efficient, reliable, and automated industrial operations. Furthermore, he discussed the broader impact of these technologies in streamlining workflows, reducing operational costs, and improving overall productivity. Mr. Gor's presentation underscored the critical role of data science as a cornerstone of Industry 4.0, driving the shift toward smarter factories where automation and intelligent data analysis work hand in hand to create sustainable competitive advantages in manufacturing.



*Lecture by Mr. Divyang Gor*

### **Ms. Suman Grewal – Senior Data Analyst, Goldman Sachs, Bangalore**

Ms. Suman Grewal delivered an insightful talk on quantitative finance, focusing on the pivotal role mathematics plays in modern banking and financial markets. She explained key concepts such as risk modeling, portfolio optimization, and time series analysis, illustrating how these mathematical tools are essential for making informed and effective financial decisions. By bridging theoretical frameworks with practical applications, Ms. Grewal demonstrated how rigorous mathematical techniques help banks and financial institutions assess risk accurately, optimize asset allocations to maximize returns while minimizing exposure, and analyze financial data trends over time to forecast market movements.

Her talk emphasized that the precision and discipline of mathematics underpin the stability and robustness of today's complex financial systems, enabling institutions to navigate uncertainty and enhance their strategic planning.



*Lecture by Ms. Suman Grewal*

### **Ms. Anuvshika Prasad – Staff Consultant, Oracle, India**

Ms. Anuvshika Prasad delivered an in-depth talk highlighting the fundamental role mathematics plays in underpinning enterprise-level software systems. She elaborated on how foundational mathematical concepts such as set theory and relational algebra are integral to database architecture, forming the basis for organizing, querying, and managing vast amounts of data with precision and reliability. Ms. Prasad explained that set theory helps define and manipulate data collections, while relational algebra provides the formal framework for database operations, allowing complex queries and data transformations to be executed efficiently. Additionally, she discussed indexing algorithms—mathematical methods designed to optimize data retrieval speed—emphasizing their importance in ensuring that enterprise databases can scale seamlessly without compromising performance. Throughout her talk, she illustrated how these mathematical principles are not merely theoretical but are actively applied in the development of robust, scalable software systems that support critical business functions. Her presentation underscored the continued relevance and necessity of mathematical rigor in the evolving landscape of enterprise solutions, where handling large-scale data efficiently and accurately is vital for organizational success.



*Lecture by Ms. Anuveshika Prasad*

### **Mr. Rahul Pandey – Manager in Research Laboratory, IGI India Pvt. Ltd.**

Mr. Rahul Pandey concluded the speaker sessions with a compelling exploration of the role of mathematical modeling in research and development aimed at driving industrial innovation. He presented detailed case studies showcasing how various mathematical tools—such as simulations, differential equations, and statistical models—have been effectively employed to optimize manufacturing processes and enhance product design. Through these examples, he illustrated how mathematical modeling enables researchers and engineers to predict system behaviors, identify potential improvements, and make data-driven decisions that accelerate innovation cycles. Mr. Pandey's address strongly reinforced the event's overarching theme by demonstrating that mathematics is not only a theoretical discipline but a practical cornerstone in advancing research-led industrial progress and fostering competitive advantage in today's fast-evolving industries.



*Lecture by Mr. Rahul Pandey*

The event concluded with a valedictory ceremony, wherein participants expressed their appreciation for the enriching sessions. The organizers extended their gratitude to all the speakers, faculty members, and attendees who contributed to the success of IMCI 4.0. Overall, the conclave provided a valuable platform for learning, networking, and exchanging ideas between academia and industry.



*Snippet During the Program*

## Report on Workshop on Evolutionary Algorithm – Genetic Algorithm

On April 3–4, 2025, the Department of Mathematics organized a two-day workshop on Evolutionary Algorithm – Genetic Algorithm (GA) to provide practical training in optimization techniques and their applications. The program was coordinated by Dr. Jayesh M. Dhodiya, Associate Professor and Head of the Department of Mathematics.

The technical sessions were conducted by Ms. Ekata Jain and Mr. Nikunj Joshi, research scholars in the department. Ms. Ekata Jain explained the optimization of polynomial functions and assignment problems using Genetic Algorithms. She introduced the key components of GA—population initialization, selection, crossover, and mutation—and demonstrated their role in reaching optimal solutions. Her MATLAB-based sessions included live demonstrations and example problems, enabling participants to grasp both the implementation and interpretation of results.

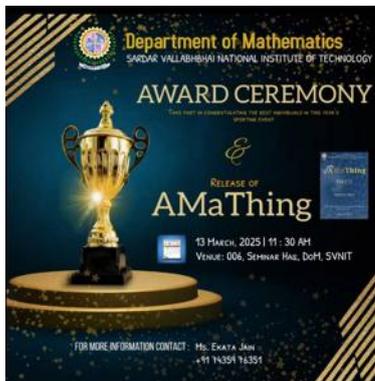
Mr. Nikunj Joshi covered the optimization of Linear Programming Problems (LPPs) using Genetic Algorithms. He guided participants through the step-by-step implementation process in Python, illustrating how GA can be applied to solve constrained optimization problems effectively. His sessions focused on practical coding, algorithm customization, and performance evaluation for different problem scenarios.

The workshop was designed as a hands-on session, where participants worked directly on practical exercises during the sessions. In the concluding part of the workshop, they were given a set of problems to solve using the techniques learned over the two days. The event successfully provided participants with valuable exposure to the application of Genetic Algorithms in solving different classes of optimization problems, bridging theoretical concepts with computational practice.



## Award Ceremony 2025, Release of AMAThing 6.0, and International Day of Mathematics Celebrations

The Department of Mathematics, Sardar Vallabhbhai National Institute of Technology (SVNIT) organized a programme on 14th March, 2025, to commemorate International Day of Mathematics and further marking two special occasions the Award Ceremony 2025, and the Release of AMAThing 6.0. The event brought together faculty members, students, and distinguished guests to celebrate academic achievements, creativity, and the spirit of mathematics.



The event began with a warm welcome by the student anchors, followed by the lighting of the lamp. The Head of the Department, Dr. Jayesh M. Dhodiya, addressed the gathering, emphasizing the department's commitment to fostering academic excellence and student engagement. The release of the sixth edition of the departmental magazine, A MaThing 6.0, was a proud moment, showcasing the creative and scholarly contributions of students and faculty alike.



The International Day of Mathematics segment featured engaging talks by faculty members including Prof. A. K. Shukla, and Prof. V. H. Pradhan, who shared insights on the theme "Mathematics and Artificial Intelligence". Their talks inspired students to explore the beauty and universality of mathematical thinking.



The Award Ceremony recognized the remarkable achievements of students across academic and extracurricular domains. Certificates and medals were presented to winners of various competitions held on National Mathematics Day (NMD), Vigilance Awareness Week, Rangoli Competition and International Day of Mathematics (IDM). The atmosphere was filled with pride and encouragement as professors felicitated the students for their dedication and excellence.



The ceremony concluded with a heartfelt vote of thanks, expressing gratitude to all faculty members, student volunteers, and participants for making the event a memorable success. The day served as a tribute to the department's vibrant academic culture and the unifying power of mathematics.

## InterAct Seminars

Internship Experience and Research Activities (InterAct) Seminar, abbreviated as InterAct Seminar, was started by Dr. R. K. Jana in 2017 with the help of a few final-year students. The following is a list of sessions conducted during the foregoing timeline.

Date	Topic	Speaker(s)
24/10/2024	Airline Operations Management	Mr. Sauparnika Nair
10/02/2025	Campus Placement/Internship Preparation (DSA & Aptitude)	Mr. Chandan Saraf
17/02/2025	Mastering Data Structures and Algorithms	Mr. Param Pathak
20/03/2025	Career in Data Science	Ms. Ishika Sanghavi

DEPARTMENT OF MATHEMATICS SVNIT

### Airline Operations Management

By - Sauparnika Nair  
5th Year  
MSc Mathematics

24th October 2024  
Time - 11:30 AM  
006 Seminar Hall, DoM

Talk on Internship experience at TCS

## InterAct Seminar

Student Co-ordinator: Nishant  
M.Sc. Mathematics  
+91 9306145426

Faculty Co-ordinator: Dr. R. K. Jana  
Associate Professor, DoM, SVNIT  
rkj@amhd.svnit.ac.in

DEPARTMENT OF MATHEMATICS SVNIT

### Campus Placement / Internship Preparation ( DSA & Aptitude )

Talk on how to prepare best for all Campus, Internship and Placements opportunities. A Comprehensive guidance curated for MSc Maths Students

By - Chandan Saraf  
5th Year  
MSc Mathematics

10th February 2025  
Time - 4:00 PM  
006 Seminar Hall, DoM

## InterAct Seminar

Student Co-ordinator: Nishant  
M.Sc. Mathematics  
+91 9306145426

Faculty Co-ordinator: Dr. R. K. Jana  
Associate Professor, DoM, SVNIT  
rkj@amhd.svnit.ac.in

DEPARTMENT OF MATHEMATICS SVNIT

### Mastering Data Structures and Algorithms - Interview Experience at VISA

Param Pathak

Upcoming SWE Intern @ Visa | Chairperson at ACM-NIT SURAT | B.Tech CSE'26 SVNIT |

17th February 2025 Time - 4:00 PM 006 Seminar Hall, DoM

## InterAct Seminar

Student Co-ordinator: Nishant  
M.Sc. Mathematics  
+91 9306145426

Faculty Co-ordinator: Dr. R. K. Jana  
Associate Professor, DoM, SVNIT  
rkj@amhd.svnit.ac.in

DEPARTMENT OF MATHEMATICS SVNIT

### Career in Data Science

Resume Building, Interview Experience with Deloitte and Preparation Guidance. Companies to Expect in 4th Year and Final Year for Internships and Placements

Ishika Sanghavi

Upcoming Data Analyst @ Deloitte USI | Training and Placement Coordinator | 5th Year MSc Mathematics |

20th March 2025 Time - 11:30 AM 006 Seminar Hall, DoM

## InterAct Seminar

Student Co-ordinator: Nishant  
M.Sc. Mathematics  
+91 9306145426

Faculty Co-ordinator: Dr. R. K. Jana  
Associate Professor, DoM, SVNIT  
rkj@amhd.svnit.ac.in



*Posters and Snippet of IntERAct Seminars*

# Achievements

## Faculty

### **Dr. V. H. Pradhan, Professor**

- Dr. V. H. Pradhan received the Prof. A. R. Rao Mathematics Research Award for his immense contribution to research in the fields of fluid Dynamics and Mathematical Modelling at the 61st Annual Conference of Gujarat Ganit Mandal on November 10, 2024.

### **Dr. Sushil Kumar, Associate Professor**

- Dr. Sushil Kumar has been appointed as Associate Dean (Faculty Welfare) w.e.f. October 26, 2024.

### **Dr. Jayesh M. Dhodiya, Associate Professor**

- Dr. Jayesh M. Dhodiya has been selected as Member of Board of Studies, Charotar University of Science and Technology (CHARUSAT), Changa, Anand.

### **Dr. Ranjan Kumar Jana, Associate Professor**

- Dr. Ranjan Kumar Jana was awarded the Best Faculty Cabin trophy by Dean (Faculty Welfare), SVNIT during Swachchhata Pakhwada during September 2024.
- Dr. Ranjan Kumar Jana chaired a Technical Session on September 27, 2024, at the International Conference on Non-linear Analysis and Scientific Computing (ICNASC-24) held at Vignan's Foundation for Science, Technology, and Research (Deemed to be University), Guntur, Andhra Pradesh, India, during September 26-28, 2024.
- Dr. Ranjan Kumar Jana chaired a Technical Session on December 13, 2024 (Track: Drivers and Barriers of Sustainable Supply Chain in India: Decarbonization, Optimization, and Greenwashing Mitigation) at International Conference on Emerging Trends in Business Analytics & Management Sciences (57th Annual Convention of Operational Research Society of India (ORSI-2024)) held at Indian Institute of Technology Bombay, during December 12-14, 2024.
- Dr. Ranjan Kumar Jana chaired a Technical Session on December 14, 2024 (Track: Advance Efficiency Models in Operations & Finance) at International Conference on Emerging Trends in Business Analytics & Management Sciences (57th Annual Convention of Operational Research Society of India (ORSI-2024)) held at Indian Institute of Technology Bombay, during December 12-14, 2024.
- Dr. Ranjan Kumar Jana was awarded an International Travel Grant from the Simons Foundation and the International Mathematical Union-Commission for Developing Countries (IMU-CDC) to attend the International Congress of Mathematicians (ICM) 2026 to be held in Philadelphia, Pennsylvania, USA during July 23-30, 2026.

## **Dr. Sudeep Singh Sanga, Assistant Professor**

- Dr. Sudeep Singh Sanga visited Industrial Engineering and Operations Research, Indian Institute of Technology Bombay as INSA Visiting Scientist during 3rd July to 2nd August 2024.

## **Students**

### **Ms. Kanchan Kushwaha (D21MA008)**

- Ms. Kanchan Kushwaha won Best Poster Award for work on “A Multi-Objective Chaotic Walrus Optimization Algorithm” at Soft Computing for Problem Solving International Conference 2025 (SocProS 2025) Artificial Intelligence for Viksit Bharat organized by Indian Institute of Technology Roorkee during February 24–25, 2025.
- Ms. Kanchan Kushwaha won Merit Paper Award for work on “CMO-OOA: A New Constrained Multi-Objective Osprey Optimization Algorithm” at the International Conference on Emerging Trends in Business Analytics and Management Sciences and 57th Annual Convention of Operational Research Society of India (BAMS-ORSI 2024) organized by Indian Institute of Technology Bombay during December 12–14, 2024.

### **Ms. Nidhi (D22MA004)**

- Ms. Nidhi was awarded an International Travel Grant from the Institute of Mathematics and its Applications (IMA) to attend the 13<sup>th</sup> IMA International Conference on Modelling in Industrial Maintenance and Reliability (MIMAR 2025) to be held at Université de Lorraine, Nancy, France, during July 8–10, 2025.

### **Mr. Aman Jaiswal (I23MA013)**

- Mr. Aman Jaiswal represented Gujarat in the 3rd edition of the National Environment Youth Parliament (NEYP '25) held at the Rajasthan Vidhan Sabha, Jaipur. He was the National Finalist.

### **Mr. Shubham Jaiswal (I23MA027)**

- Mr. Shubham Jaiswal has attended the Online Foundation Course in Mathematics 2024 during August 18–31, 2024.

### **Mr. Maharshee Kalpeshkumar Shah (I23MA030)**

- Mr. Maharshee Kalpeshkumar Shah has attended Online Foundation Course in Mathematics 2024 during August 18–31, 2024.

## Mr. Harsh Thakkar (I23MA060)

- Mr. Harsh Thakkar got 1st rank in the event named “Investors Challenge” organized by Cutting Edge Visionaries Club, Sardar Vallabhbhai National Institute of Technology, Surat, India, on September 15, 2024.
- Mr. Harsh Thakkar got 2nd Runner-Up in the event named “Trade Quest Challenge” during Paradox24 Fest organized by Indian Institute of Technology Madras, India, during May, 2024.
- Mr. Harsh Thakkar got 2nd rank in the event named “Tycoons Triumph” during StartUp Expo organised by Research and Innovative Affairs Council, Sardar Vallabhbhai National Institute of Technology, Surat, India, during May 2024.

## GATE 2025 Qualifiers

DEPARTMENT OF MATHEMATICS, SVNIT  
*Congratulates Students*  
for clearing GATE 2025

**MATHEMATICS**

 SOHAN NAYAK AIR 274	 SHRUTI SHAH AIR 317	 ABHISHEK KUMAR AIR 339	 DEEPAK SINGH AIR 492
 DUSHYANT AIR 531	 GURU PREETHAM LAKKKAKULA AIR 657	 JANSI VAGHASIYA AIR 819	 RAMESH VANKUDOTHU AIR 2773

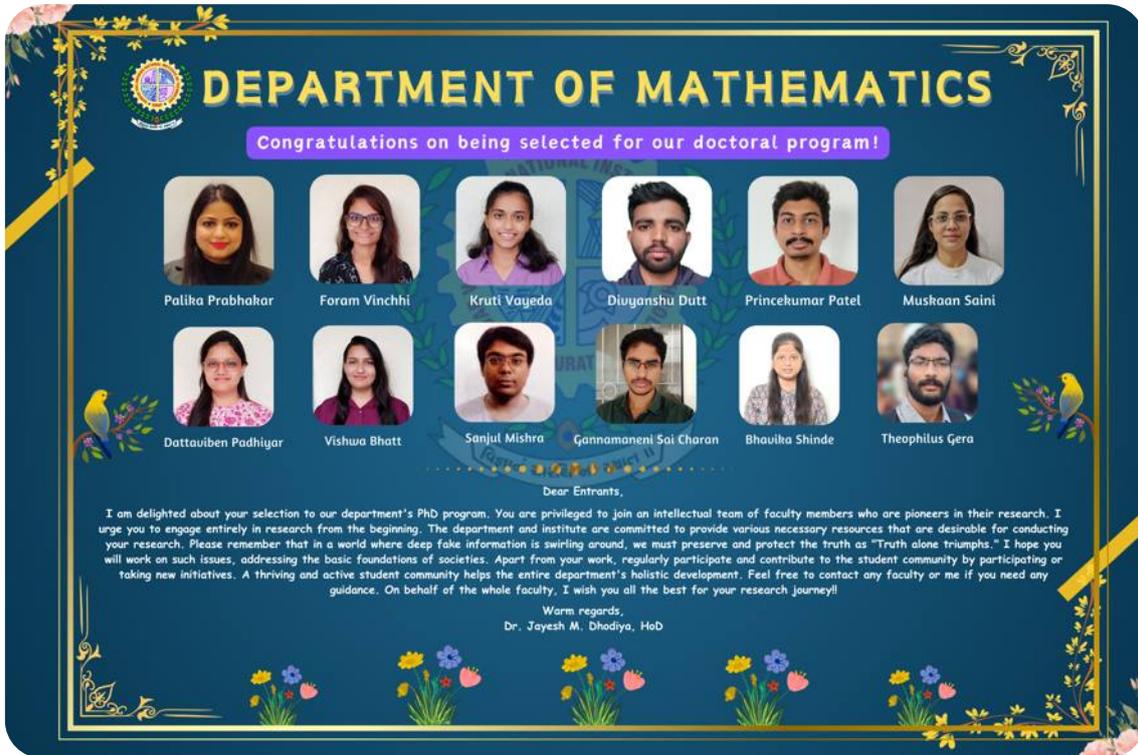
**DATA SCIENCE AND ARTIFICIAL INTELLIGENCE**

 DHARMIK PATEL AIR 170	 TARANG PANSURIYA AIR 178	 DHANANI JATINBHAI AIR 3333
 ABHISHEK KUMAR AIR 4521	 RAJ KUMAR AIR 7217	

**STATISTICS**

 TARANG PANSURIYA AIR 175
 DHARMIK PATEL AIR 268

## Autumn Semester



**DEPARTMENT OF MATHEMATICS**

Congratulations on being selected for our doctoral program!

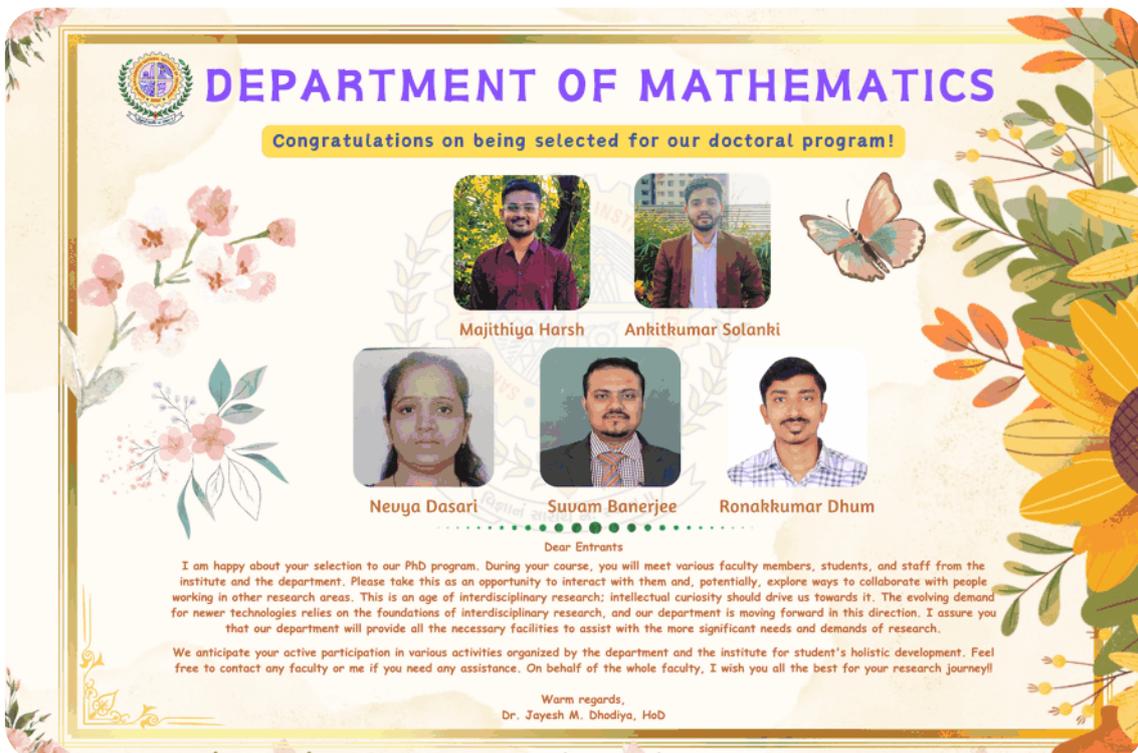
Palika Prabhakar, Foram Vinchi, Kruti Vayeda, Diyanshu Dutt, Princekumar Patel, Muskaan Saini, Dattauben Padhiyar, Vishwa Bhatt, Sanjul Mishra, Gannamaneni Sai Charan, Bhavika Shinde, Theophilus Gera

Dear Entrants,

I am delighted about your selection to our department's PhD program. You are privileged to join an intellectual team of faculty members who are pioneers in their research. I urge you to engage entirely in research from the beginning. The department and institute are committed to provide various necessary resources that are desirable for conducting your research. Please remember that in a world where deep fake information is swirling around, we must preserve and protect the truth as "Truth alone triumphs." I hope you will work on such issues, addressing the basic foundations of societies. Apart from your work, regularly participate and contribute to the student community by participating or taking new initiatives. A thriving and active student community helps the entire department's holistic development. Feel free to contact any faculty or me if you need any guidance. On behalf of the whole faculty, I wish you all the best for your research journey!

Warm regards,  
Dr. Jayesh M. Dhodiya, HoD

## Spring Semester



**DEPARTMENT OF MATHEMATICS**

Congratulations on being selected for our doctoral program!

Majithiya Harsh, Ankithkumar Solanki, Neuya Dasari, Suvam Banerjee, Ronakkumar Dhum

Dear Entrants

I am happy about your selection to our PhD program. During your course, you will meet various faculty members, students, and staff from the institute and the department. Please take this as an opportunity to interact with them and, potentially, explore ways to collaborate with people working in other research areas. This is an age of interdisciplinary research; intellectual curiosity should drive us towards it. The evolving demand for newer technologies relies on the foundations of interdisciplinary research, and our department is moving forward in this direction. I assure you that our department will provide all the necessary facilities to assist with the more significant needs and demands of research.

We anticipate your active participation in various activities organized by the department and the institute for student's holistic development. Feel free to contact any faculty or me if you need any assistance. On behalf of the whole faculty, I wish you all the best for your research journey!

Warm regards,  
Dr. Jayesh M. Dhodiya, HoD



## DEPARTMENT OF MATHEMATICS SARDAR VALLABHBHAI NATIONAL INSTITUTE OF TECHNOLOGY

### CONGRATULATES AND WELCOME'S ENTERING CLASS OF 2024

#### BACHELOR OF TECHNOLOGY (MATHEMATICS AND COMPUTING)



#### INTEGRATED MASTER OF SCIENCE (MATHEMATICS)



WE WISH YOU THE BEST IN YOUR ACADEMIC ENDEAVOURS!!

# Expert Lectures Delivered by Faculty

Prof. V. H. Pradhan delivered an expert talk on “FDM & FEM for Science & Technology” in the 5-day Short Term Training Program (STTP) on “Mathematical Modelling and Simulation in Physics” organized by the Department of Applied Science & Humanities, Parul Institute of Technology, Parul University, Vadodara, Gujarat, India, in collaboration with The Mathematics Consortium, during August 13-14, 2024.

Dr. Jayesh M Dhodiya delivered an expert talk on “Earning with Learning” at Department of Mathematics, SVNIT Surat organized by Swavalambi Bharat Abhiyan on September 12, 2024.

Dr. Jayesh M Dhodiya delivered an expert talk on “Mathematical Modelling and Simulation for the solution of real world problems” in short term training programme organized by Parul University, Vadodara, Gujarat, India on October 13, 2024.

Dr. Jayesh M Dhodiya delivered an expert talk on “Artificial Intelligence through Computational Mathematical and Simulation Model” at P. G. Science College Bardoli, Gujarat, India on October 30, 2024.

Dr. Ranjan Kumar Jana delivered an invited talk on “Multi-Objective Optimization Problem: Basics and Applications” at Special Seminar of Midnapore College, Midnapore on August 07, 2024.

Dr. Ranjan Kumar Jana delivered an invited talk on “Approximate Analytical Methods for Soliton solution of damped KdV equation in unmagnetised superthermal plasma” at International Conference on Non-linear Analysis and Scientific Computing (ICNASC-24) held at Vignan’s Foundation for Science, Technology, and Research (Deemed to be University), Guntur, Andhra Pradesh, India during September 26-28, 2024.

Prof. V. H. Pradhan delivered an expert talk entitled “Finite Difference Methods for Science and Engineering” at the “61st Annual Conference of Gujarat Ganit Mandal” organized by Gujarat Ganit Mandal at Amreli, Gujarat state, during November 10 - 12, 2024.

Dr. Sushil Kumar delivered an expert talk entitled “Thermal Damage Analysis in Skin Tissue using Space-Time Fractional Single-phase-lag and Dual-phase-lag Heat Transfer Model” at the “6th International Conference on Emerging Trends on Sustainable Approaches in Science & Technology (ICETSAST-2024)” organized by Maa Shakumbhari Trust, Greater Noida, India during February 24-25, 2025.

Dr. Ranjan Kumar Jana delivered an expert talk entitled “Interdisciplinary Project Work and Applications: Use of Optimization Techniques” at the “One-Week Workshop on Interdisciplinary Computing in Basic and Applied Sciences” organized by MathTech Thinking Foundation in collaboration with SVNIT, Surat and Others during December 9-15, 2024.

Dr. Ranjan Kumar Jana delivered an expert talk entitled “Interdisciplinary Project Work and Applications: Use of Data Assimilation” at the “One-Week Workshop on Interdisciplinary Computing in Basic and Applied Sciences” organized by MathTech Thinking Foundation in collaboration with SVNIT, Surat and Others during December 9–15, 2024.

Dr. Ranjan Kumar Jana delivered an expert talk entitled “Inequalities associated with Special Functions” at the “International Conference on Algebra, Analysis, Dynamics and their Applications (ICAADA 2025)” organized by Midnapore College, West Bengal, during January 22–25, 2025.

Dr. Jayesh M. Dhodiya delivered an invited talk entitled “Ordinary Differential Equations Based Mathematical and Simulation Modelling” at the Navyug Science College, Surat on February 14, 2025.

Dr. Ranjan Kumar Jana delivered an invited talk entitled “Application of Transform techniques to solve initial and boundary value problems” at the “8th Module Academic Guest Lecture” organized by VIT University, Vellore on March 11, 2025.

Dr. Ranjan Kumar Jana delivered an invited talk entitled “Probability, Statistics & Data Assimilation: Some Case Studies” as “Industry Expert Lecture” organized by Department of Mathematics, School of Advanced Sciences, VIT University, Vellore on April 7, 2025.

Dr. Ranjan Kumar Jana delivered an invited talk entitled “Multi-Objective Optimization Problem: Some Applications” at the “5-Day International Workshop on Theory and Applications of Optimization in Machine Learning (IWTAOML-2025)” organized by Department of Mathematics, School of Advanced Sciences (SAS), VIT-AP University, Amaravati on April 8, 2025.

Dr. Ranjan Kumar Jana delivered an invited talk entitled “Overview of Optimization Techniques & Applications” as “Industry Expert Lecture” organized by Department of Mathematics, School of Advanced Sciences, VIT University, Vellore on April 9, 2025.

Dr. Ranjan Kumar Jana conducted an expert session entitled “Application of Transform Techniques to solve Initial and Boundary Value Problems (IVP & BVP)” at the Dr. S. & S. S. Ghandhy Government Engineering College, Surat on May 5, 2025.

Dr. Ranjan Kumar Jana delivered an invited talk entitled “Data Assimilation: Recent Advances and Applications” at the “Two day International Webinar on Recent Advances and Emerging Applications of Mathematics” organized by Department of Mathematics, Ghatal Rabindra Satabarsiki Mahavidyalaya, West Bengal on May 22, 2025.

Dr. Indira P. Tripathi delivered an expert talk on “Support Vector Machine using Python: Concepts & Coding” at a “Workshop on MATLAB and PYTHON Programming (MPP-2025)” organized by the Department of Mathematics, National Institute of Technology Jamshedpur, during May 19–23, 2025.

# Internships/Summer Schools of M.Sc. Students

## Rajrapu Mahesh (I20MA002)

He has done Research Internship at Korea Advanced Institute of Science & Technology (KAIST), Daejeon, South Korea, between June 24, 2024 and August 14, 2024.



**His work in his words:** This summer, as a part of the KAI-X Summer Research Internship Program-2024 offered by Korea Advanced Institute of Science and Technology (KAIST), South Korea, I had the incredible opportunity to work as a research intern under the esteemed guidance of Prof. Chang-Ock Lee. My internship focused on developing advanced reconstruction and denoising techniques to enhance the quality of medical imaging. The project involved integrating the Simultaneous Iterative Reconstruction Technique (SIRT), Total Variation (TV) Denoising, and Convolutional Neural Networks (CNNs). SIRT iteratively refined image quality by minimizing projection errors, while TV Denoising effectively reduced noise without compromising critical details like edges. Additionally, CNNs were trained on large datasets to perform adaptive denoising, resulting in improved image clarity and reduced artifacts. This hybrid approach demonstrated significant promise in boosting diagnostic utility, reducing computational load, and enabling applications in other imaging modalities like MRI and PET. This experience greatly expanded my technical knowledge and deepened my passion for innovations in medical imaging and healthcare technology.

## Soumydeep Mandal (I20MA004)

He has done Research Internship at Indian Institute of Technology Kanpur, India, between May 15, 2024 and July 15, 2024.



**His work in his words:** It was a wonderful experience to perform research under the guidance of Dr. Saurabh Kumar Singh of IIT Kanpur. I studied  $p$ -Adic numbers and automorphic forms and really enjoyed my time there.

## Ishika Sanghavi (I20MA011)

She has done internship at Data Centre and Analytics Lab (DCAL), Indian Institute of Management Bangalore, India.



**Her work in her words:** I did my summer internship under the guidance of Dr. U. Dinesh Kumar.

## Jansi Vaghasiya (I21MA002)

She has done an internship at Department of Mathematics, Sardar Vallabhbhai National Institute of Technology, Surat, India, between May 12, 2024, and July 12, 2024.



**Her work in her words:** I have done research on Load Sharing on  $k$ -out-of- $n$  system with exponential model under progressively censored data. In which I have generated progressive data using R software and analyse it with mle, Bayesian, maximum product spacing, etc. along with real data.

### Tanay Parikh (I21MA003)

He has done an internship at Haverly Systems, New Jersey, United States of America, between May 20, 2024, and July 19, 2024.



**His work in his words:** At Haverly Systems, I had the opportunity to delve into mathematical modeling and optimization, collaborating with mathematicians to design constraints for a real-world problem. This experience helped me connect theoretical knowledge with practical applications, sharpening my problem-solving skills. Being exposed to a new work culture also expanded my perspective in meaningful ways.

### Shrusti Upadhyay (I21MA004)

She has done an internship at Department of Mathematics, Sardar Vallabhbhai National Institute of Technology, Surat, India, between May 12, 2024, and July 12, 2024.



**Her work in her words:** I had done a summer research internship on the topic "Portfolio Optimization : A comparison of the metaheuristic techniques" under the expert guidance of Dr. Ranjan Kumar Jana. I worked with the stocks data of APPL. Inc and tried to compare its optimized results using three metaheuristic methods namely Lion Optimization Algorithm, Particle Swarm Optimization and the Jaya Algorithm.

### Vidhi Panchal (I21MA006)

She has done an internship at the Department of Mathematics, Sardar Vallabhbhai National Institute of Technology, Surat, India, between May 20, 2024 and July 11, 2024.



**Her work in her words:** During my summer research internship, I analyzed the dynamical system called, fractional Rössler system using the Variational Iteration Method (VIM) under the guidance of Dr. Twinkle R. Singh. The study focused on deriving approximate solutions, identifying chaotic behavior, and visualizing results through the phase portraits. This work highlighted novel way to approximate the system of fractional differential equations. This internship deepened my understanding of dynamical systems and fractional differential equations.

### Abhishek Bisoyi (I21MA013)

He has done an internship at the Department of Statistics, University of Delhi, India, between April 28, 2024 and July 12, 2024.



**His work in his words:** During this internship, we evaluated the landscape of healthcare research, the integration of advanced statistical methodologies with physiological data which is pivotal for developing predictive models and enhancing patient care. Our study uses ARIMA, GARCH, and FLDA to analyze and predict heart and respiration rates, uncover patterns and anomalies as well. The ARIMA and GARCH models' orders were selected on the basis of ACF and PACF plots for each patient. Logistic regression, contingency tables, and Bayesian analysis categorize patients and assess cardiovascular and respiratory disorder risks, aiming to improve patient diagnosis and outcomes.

### Kritika Goyal (I21MA023)

She has done an internship at DME, Gravity Bath Pvt. Ltd., Ghaziabad, India, between May 15, 2024 and July 15, 2024.



**Her work in her words:** I worked in the field of data analytics. My internship proved to be a pivotal moment in my academic journey. I eagerly applied my theoretical knowledge to real-world projects, gaining invaluable experience in data cleaning, analysis, and visualization using industry-standard tools. Collaborating with experienced professionals not only honed my technical skills but also fostered essential soft skills like effective communication and teamwork. The opportunity to work on diverse projects across the data lifecycle ignited my passion for data analytics, showcasing its immense potential to drive informed decisions and solve real-world challenges. This internship solidified my career aspirations and fueled my motivation to continue exploring the exciting field of data science.

### Bhavik Dodda (I22MA007)

He has attended ACM Summer School on Algorithmic Game Theory hosted by Institute of Mathematical Sciences, Chennai, India between July 1, 2024 to July 12, 2024.



**His experience in his words:** It was a 12 day program with 3 talks/lectures+Q&A session per day. Various professors from IITs, and also research scientists from Google DeepMind had come to give the talks. Topics Covered: Inverse game theory, Auctions, Mechanism Design, Games on Graphs, Matching without monetary transfer, Stable Matching algorithms, Social Choice and Voting frameworks, House Allocation problem, Cooperative Game Theory, Fair Division and fairness notions, Routing Games, Complexity Theory, AI for 2-player games, Collaborative Reinforcement Learning.

### Bhavik Dodda (I22MA007)

He has done a remote winter internship at FOSSEE, IIT Bombay from November 12, 2024 to January 10, 2025.



**His work in his words:** The projects I've taken up at FOSSEE, SOUL (Science Opensource Software for Teaching Learning) enabled me to work on ideas I've always wanted to, while also collaborating and coordinating tasks with peers from other universities, to contribute to open source projects.

### Suraj Kr. Mishra (I22MA046)

He has done an internship at Aryabhata Classes, Delhi, India, between April 24, 2024 to July 24, 2024.



**His work in his words:** I am glad to share my mathematical knowledge to classes 10 and 12, JEE batches.

### Sukhda Baruna (I21MA052)

She has done an internship at Indian Institute of Technology Jodhpur, India, between June 5, 2024 and July 15, 2024.



**Her work in her words:** Got an opportunity to do internship under Dr. Bimal Mandal, IIT Jodhpur, in the topic- Study of Differential Cryptanalysis on Block Ciphers from 5th June to 15th July. The topic was based on Cryptography which is the major branch considered under Cyber Security. During my internship, I got to know much more about Modern Ciphers like Block Ciphers and their weaknesses, which promotes attack on them.

## Maharshee Kalpeshkumar Shah (I23MA030)

He has done a Workshop of InitMath conducted by MTTs, between January 06, 2025 and January 11, 2025 at Vitthalbhai Patel & Rajratna P. T. Patel Science College, Gujarat.



**His work in his words:** It was an amazing experience during which I learned the basics of real analysis, linear algebra, and set theory. Overall, it enhanced my deep understanding of these topics.



## Dr. Nisha Pokharna (DS19MA012)

**Title of Thesis:** “Some Contributions to Optimality Criteria and Duality in Nonlinear Optimization Problems”

**Supervisor:** Dr. Indira P. Tripathi

**Date of Defense:** July 19, 2024

**Abstract:** This thesis discusses optimality conditions, duality, and related results for different nonlinear optimization problems and presents real-life applications illustrating the usefulness of this study. Chapter 1 recalls basic formulations of optimization problems. Chapter 2 introduces the notion of a strong  $E$ -invex function and  $E$ -convex functional using the  $E$ -operator. Chapter 3 studies an interval fractional optimization problem with directionally differentiable functions. Chapter 4 introduces  $B-(p, r)$  invexity and symmetric  $LU$ -pseudoconvexity concepts for interval-valued functionals. Chapter 5 introduces a new approximation approach for multi-objective complex programming problems and their duals using  $F$ -convexity. Chapter 6 investigates a class of multiobjective optimization problems with interval objective functions and constraints. Chapter 7 explores an equivalence between the interval fractional problem with gdivision and its nonfractional problem.



## Dr. Lalchand Verma (D19MA005)

**Title of Thesis:** “Study of Magneto Hydrodynamics Thermal Hybrid Nanofluid Flow with Fuzzy Volume Fractions using a Double Parametric Approach”

**Supervisors:** Dr. Ramakanta Meher

**Date of Defense:** July 29, 2024

**Abstract:** In this thesis, we discuss the effect of various parameters on the nature of velocity and thermal profiles of the Magneto-hydrodynamics Jeffery-Hamel flow between two rectangular inclined smooth walls using a novel double parametric method based on the homotopy analysis method in an uncertain environment. The nanoparticle volume fraction is a crucial parameter in the study of nanofluid flow, as it determines the thermophysical properties of the nanofluid and thus affects its velocity and temperature profiles. In converging and diverging channels, the flow of nanofluids can be complex, and the uncertainty in the nanoparticle volume fraction can lead to a range of possible velocity distributions and temperature distributions. This is why the nanoparticle volume fraction is often expressed as a fuzzy number, which accounts for the uncertainty in its value.



## Dr. Bhagya Shree Meena (DS19MA006)

**Title of Thesis:** “Computational Study on Hyperthermia Treatment in Multidimensional Biological Tissue using Space–Time Collocation Method”

**Supervisors:** Dr. Sushil Kumar

**Date of Defense:** November 8, 2024

**Abstract:** This thesis aims to provide an understanding of the RBF collocation method and related analysis for solving the bioheat models and time-space fractional bioheat models in 2D and 3D arbitrary tissue domains. In the initial chapters, the two-dimensional SPL, DPL, and TPL bioheat models in the regular and irregular tumor domains have been considered to simulate the biological hyperthermia process irradiated by external heat sources such as magnetic nanoparticle heat sources and time-dependent heat sources. The solutions are obtained using the meshless technique. The numerical results compared with the analytical solution are found to be in good agreement. Conclusions are drawn based on graphical results. The fractional bio-heat models are solved in the last four chapters. The two- and three-dimensional time-space fractional Pennes, single-phase, and dual-phase lag bioheat transfer models are solved to predict the temperature and thermal damage in tumor and healthy tissue. These models consider non-Fourier as well as non-local effects. The thermal damage to the heated tissue is estimated using the Arrhenius equation. The space-time collocation method is used to solve the mathematical models. Also, the impact of fractional derivatives and heat source parameters on tissue temperature profiles has been discussed.



## Dr. Aishwarya Sanjaykumar Bajaj (D20MA003)

**Title of Thesis:** “Solution of Some Uncertain Multi-objective Travelling Salesman Problems with Modified Meta-Heuristic MOQO Jaya Algorithms”

**Supervisor:** Dr. Jayesh M. Dhodiya

**Date of Defense:** December 11, 2024

**Abstract:** The study focuses on solving uncertain multi-objective travelling salesman problems (MOTSP) using modified Multi-Objective Quasi-Oppositional (MOQO) Jaya algorithms, specifically Aspiration Level (AL)-based and Reference Point Aspiration Level (RPAL)-based MOQO Jaya. The study addresses various MOTSP variants, including solid, constraint-based, green, multi-route, and four-dimensional MOTSP, under different environments such as crisp, fuzzy, and uncertain settings. Real-world factors like cost, time, distance, carbon emissions, and risk constraints are incorporated to reflect practical decision-making challenges. Traditional optimization techniques, including genetic algorithms, fuzzy programming, and CPLEX, often fail to generate a well-diversified set of Pareto-optimal solutions efficiently. The proposed algorithms overcome this limitation by improving convergence speed, robustness, and computational efficiency while providing multiple compromise solutions. Benchmark TSPLIB datasets and real-world problems from Surat city validate the effectiveness of the developed methods. The research demonstrates that RPAL and AL-based MOQO Jaya algorithms outperform existing approaches in terms of computational efficiency and quality of solutions, making them valuable tools for solving complex NP-complete MOTSP variants under uncertainty. Sensitivity analysis and performance are calculated using coverage, hypervolume, and generation distance, which shows the effectiveness of the proposed algorithm in handling uncertain optimization problems, providing an efficient framework for decision-makers in transportation and logistics.



## Dr. Jayesh Savaliya (DS19MA005)

**Title of Thesis:** “A Study on Fixed Points in Non-Triangular Metric Spaces and its Applications”

**Supervisor:** Dr. Shailesh Kumar Srivastava

**Co-supervisor:** Dr. Dhananjay Gopal, *Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur.*

**Date of Defense:** January 6, 2025

**Abstract:** In this thesis, we introduce the pseudo non-triangular metric spaces, which eventually becomes a generalized structure of non-triangular metric but fails to generalize it in the sense of proving the fixed point theorem. Chapter 1 recalls some basic and essential concepts and results relevant to the subsequent chapters. Chapter 2 discusses the generalization of non-triangular metric spaces, referred to as pseudo non-triangular metric spaces. Chapter 3 investigates various contraction mapping in non-triangular metric spaces, especially  $F$ -contraction, and  $(\psi, \phi)$ -contraction. Chapter 4 addresses the solution to Rhoades’ open problem. Chapter 5 examines the geometric aspects of the fixed-point set of a self-mapping, with a focus on various forms such as fixed discs, fixed ellipses, and fixed Cassini curve problems.



## Dr. Hemant Bhardwaj (D19MA002)

**Title of Thesis:** “Numerical Modeling of  $\text{Ca}^{2+}$  and  $\text{IP}_3$  Dynamics in a T-lymphocyte Cell”

**Supervisor:** Dr. Neeru Adlakha

**Date of Defense:** March 11, 2025

**Abstract:** This Ph.D. thesis presents a comprehensive computational study of the interplay between  $\text{Ca}^{2+}$  and  $\text{IP}_3$  dynamics in T lymphocyte cells, addressing a critical gap in understanding their interdependence and roles in immune regulation. Leveraging numerical techniques such as the Crank-Nicolson scheme, radial basis functions, finite element methods, and the Grunwald-Letnikov approach, the research investigates the effects of source influx, buffers, pumps, leaks, advection, and diffusion in one-, two-, and three-dimensional models. The work begins with an overview of T cell physiology, signaling pathways, and related fluxes, followed by the mathematical foundations and numerical methods employed. Successive chapters detail advanced modeling approaches, including local radial basis function differential quadrature with Runge-Kutta integration for nonlinear reaction-diffusion equations, FEM-based analyses of NFAT regulation, fractional-order spatiotemporal modeling revealing superdiffusion effects, and multi-dimensional coupled  $\text{Ca}^{2+}$ - $\text{IP}_3$  simulations incorporating key cellular components such as  $\text{IP}_3\text{R}$ ,  $\text{RyR}$ , SERCA pumps, and buffering mechanisms. The integration of these models provides high-resolution insights into intracellular signaling, offering valuable data for biomedical research, diagnostics, and therapeutic protocol development, and contributing significantly to the field of computational immunology.



## Dr. Yadav Jyoti Ugrasen (DS19MA003)

**Title of Thesis:** “Solution of Fluid Flow Problems with Fractional Approach by Variational Iteration Transform Method”

**Supervisor:** Dr. Twinkle R. Singh

**Date of Defense:** April 25, 2025

**Abstract:** This thesis examines fluid flow through porous media using a fractional calculus approach, focusing on the solution of time-fractional nonlinear partial differential equations arising in various physical processes. A variational iteration transform method is used to obtain approximate analytical solutions, providing improved accuracy and efficiency over existing methods. The work begins with fundamental concepts of fluid dynamics and porous media, extending to generalized Darcy’s law and its applications in oil recovery processes. The proposed methodology is applied to different models of fluid flow, demonstrating its versatility in handling complex boundary conditions and nonlinearities. Numerical simulations validate the method’s effectiveness and highlight the influence of fractional order parameters on the dynamics of fluid transport. This research contributes to advancing analytical techniques for fractional differential equations and offers potential applications in engineering, petroleum recovery, and environmental studies.



## Dr. Kothiya Ankit Babubhai (DS19MA008)

**Title of Thesis:** “Development of Feedback Models for Regulatory Dynamics of Calcium with  $IP_3$ , PLC, PKC,  $TGF-\beta$ , DA and Nitric Oxide Signaling in a Fibroblast Cell”

**Supervisor:** Dr. Neeru Adlakha

**Date of Defense:** May 6, 2025

**Abstract:** This thesis, Development of Feedback Models for Regulatory Dynamics of Calcium with  $IP_3$ , PLC, PKC,  $TGF-\beta$ , Dopamine, and Nitric Oxide Signaling in a Fibroblast Cell, presents mathematical models to investigate the spatiotemporal interactions among key signaling molecules in fibroblast cells using finite element and Crank–Nicholson methods for one-, two-, and three-dimensional cases. The work systematically examines calcium dynamics and its regulation by  $IP_3$ , ATP, PLC, PKC,  $TGF-\beta$ , dopamine, and nitric oxide, incorporating processes such as diffusion, buffering, leaks, pumps, and feedback loops. Numerical simulations reveal how variations in parameters like influx rates, buffer concentrations, and diffusion coefficients alter calcium-dependent production and degradation of  $IP_3$  and ATP, influencing fibroblast functions linked to wound healing, inflammation, fibrosis, and cancer. By analyzing both single and multi-molecule systems, the study identifies potential mechanisms by which dysregulation of these pathways contributes to fibrotic diseases, while also validating the proposed computational framework against existing results.

# Ph.D. Students

Guide : Dr. A. K. Shukla



**MAHAJAN SAMIKSHA SATISH (DS21MA003)**

**FIR**

**Research Area** : Special Functions

**ERS**

**GAJERA SAGARKUMAR BHARATBHAI (DS21MA006)**

**Research Area** : Special Functions



**THACKER SONIYA LAXMIDAS (D23MA004)**

**ERS**

**Research Area** : Fractional Calculus

Guides : Dr. A. K. Shukla and Dr. Ranjan Kumar Jana



**PALIKA PRABHAKAR (D24MA001)**

**FIR**

**Research Area** : Special Functions

Guide : Dr. V. H. Pradhan



**PALAV MANSI SUBHASH (DS20MA001)**

**ERS**

**Research Area** : Fluid Flow through Porous Medium, Numerical Methods

**FIR**

**GOSIYA SANJAYBHAI LILABHAI (DS20MA002)**

**Research Area** : Fluid Flow through Porous Medium, Numerical Methods



**Guide : Dr. Neeru Adlakha**



**VEDIKA MISHRA (D20MA001)**

**Thesis Submitted**

**Research Area** : Computational Biology

**Thesis Submitted**

**VAISHALI (D20MA002)**

**Research Area** : Computational Biology



**YOGITA (D21MA009)**

**FIR**

**Research Area** : Mathematical Modelling

**FIR**

**DASARI NEVYA VENKATESWARL (DS24MA004)**

**Research Area** : Mathematical Biology



**Guide : Dr. Sushil Kumar**



**SAKARIYA HARSHADKUMAR H. (DS19MA001)**

**Thesis Submitted**

**Research Area** : Non linear fractional partial differential equations

**Thesis Submitted**

**RAKESH KUMAR MEENA (D20MA006)**

**Research Area** : Semi-Analytical Solutions of NPDEs using the RPS method





**RAVI SHANKAR PRASAD (DS22MA004)** **FIR**

**Research Area** : Biomathematics

**FIR** **PREETI PANT (D23MA002)**

**Research Area** : Mathematical modelling of tissue growth in wound healing



**Guides : Dr. Sushil Kumar and Dr. A. K. Shukla**



**ARVIND KUMAR MISHRA (DS17MA001)** **Thesis Submitted**

**Research Area** : Numerical solution of fractional differential equation using Legendre collocation method

**Guide : Dr. Jayesh M. Dhodiya**



**TODKAR ANIKET SARKERAO (DS19MA009)** **Thesis Submitted**

**Research Area** : Multi-objective Optimization

**ERS** **RADADIYA HARDIKKUMAR SURESHBHAJ (D22MA001)**

**Research Area** : Evolutionary approach to solve Multi-Objective Transportation Problems



**EKATA JAIN (DS22MA005)** **FIR**

**Research Area** : Multi-objective Optimization Techniques



**FIR** **JOSHI NIKUNJ K. (D23MA006)**

**Research Area** : Multi-Objective Optimization





**GAJJAR RUCHIBEN HITESHBHAI (D23MA010)** **ERS**

**Research Area** : Multi-objective Optimization Problem

**FIR** **DATTAVIBEN PADHIYAR (D24MA010)**

**Research Area** : Multi-objective Optimization



**RONAKKUMAR DHUM (DS24MA005)** **ERS**

**Research Area** : Evolutionary approach to solve Multi objective optimization problem

**Guide : Dr. Twinkle R. Singh**



**RACHHADIYA BHAVINBHAI MANSUKHBHAI (D20MA008)** **FIR**

**Research Area** : Hermite-Hadamard Inequality

**ERS** **AKSHEY (D21MA005)**

**Research Area** : Fractional Mathematical Modeling



**NIKITA CHAUDHARY (D23MA001)** **ERS**

**Research Area** : Mathematical Modelling

**FIR** **DIVYANSHU (D24MA005)**

**Research Area** : Fractional Calculus





**BHATT VISHWA RAJESH (D24MA008)** ERS

**Research Area** : Mathematical Modelling

**Guide : Dr. Ranjan Kumar Jana**



**RITUPARNA MONDAL (D19MA003)** ERS

**Research Area** : Inventory Model

**FIR** **BHAMMAR KANUBHAI MADHUBHAI (D21MA003)**

**Research Area** : Special Functions



**KANCHAN KUSHWAHA (D21MA008)** FIR

**Research Area** : Operations Research

**ERS** **JAYDIP RAMAJIBHAI CHAUHAN (DS22MA002)**

**Research Area** : Mathematical Analysis



**GAOLI SHUBHAM YADAORAO (D23MA009)** ERS

**Research Area** : Fractional Differential and Special Functions

**FIR** **VINCHHI FORAM DHANJI (D24MA002)**

**Research Area** : Fractional Calculus



Guides : Dr. Ranjan Kumar Jana and Dr. A. K. Shukla



**KARIYA NIYATI BHAVESHBHAI (DS23MA003)**

ERS

**Research Area** : Special Functions, Integral Transforms

Guides : Dr. Ranjan Kumar Jana and Dr. Muslim Malik



**SHINDE BHAVIKA DADASO (D24MA013)**

FIR

**Research Area** : Fractional Differential Equations

Guide : Dr. Ramakanta Meher



**PARTHKUMAR P. SARTANPARA (DS19MA002)**

Thesis Submitted

**Research Area** : Fluid Dynamics

ERS

**DARSHAK P. PANDYA (DS19MA011)**

**Research Area** : Analytical and numerical Study of different types of non-linear equations arising in fluid flow through porous media



**AJAY KUMAR (D20MA009)**

ERS

**Research Area** : Fluid Dynamics and Fractional Differential Equation

FIR

**VISHALKUMAR JAYANTIBHAI PRAJAPATI (D20MA010)**

**Research Area** : Fractional Differential Equations, Fluid Dynamics





**KIRAN DHIRAWAT (DS21MA007)** **FIR**

**Research Area** : Fluid Dynamics & Numerical Method

**FIR** **UPASNABEN DILUBHAI VALA (DS23MA001)**

**Research Area** : Fluid Dynamics



**SOLANKI ANKITKUMAR JITENDRABHAI (DS24MA002)** **ERS**

**Research Area** : Fluid Dynamics

**ERS** **MAJITHIYA HARSH VARJANGBHAI (DS24MA003)**

**Research Area** : Fluid Dynamics



**Guide : Dr. Indira P. Tripathi**



**ARORA MAHAMADSOHIL ANVAR (DS21MA004)** **FIR**

**Research Area** : Semi-infinite Programming

**FIR** **HARTIKKUMAR KANTIBHAI BAPOLIYA (D23MA003)**

**Research Area** : Fuzzy Transportation Problem



**PATEL PRINCEKUMAR DHARMENDRABHAI (D24MA006)** **FIR**

**Research Area** : Twin Support Vector Machine, Machine Learning

Guide : Dr. Shailesh Kumar Srivastava



**LUHAR SHIVANIBEN KAUSHIKBHAI (DS22MA003)**

**FIR**

**Research Area** : Trigonometric Fourier Approximation

**ERS**

**ZAPADIYA NILESH (D23MA008)**

**Research Area** : Trigonometric Fourier Approximation



Guide : Dr. Raj Kamal Maurya



**AMAN PRAKASH (D21MA007)**

**FIR**

**Research Area** : Statistical Inference

**FIR**

**VAIBHAVBHAI NARESHBHAI DHAMELIYA (DS21MA001)**

**Research Area** : Reliability theory, Survival Analysis



**ANIL MAURYA (D23MA005)**

**FIR**

**Research Area** : Reliability and Inference Category

Guide : Dr. Amit Sharma



**ADITI (D21MA004)**

**FIR**

**Research Area** : Algebraic Coding Theory

**FIR**

**SAUMYA SHAH (DS21MA005)**



**Research Area** : Algebraic Coding Theory



**DAVE PINAKIN M (D23MA007)**

**ERS**

**Research Area** : Algebraic Coding Theory

**FIR**

**THEOPHILUS GERA (D24MA009)**



**Research Area** : Noncommutative Algebra

Guide : Dr. Sudeep Singh Sanga



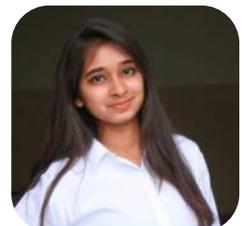
**ANTALA KHUSHBU SHANTILAL (DS21MA002)**

**Thesis Submitted**

**Research Area** : Queueing Theory

**FIR**

**NIDHI (D22MA004)**



**Research Area** : Queueing Theory



**PANCHAL VIJAYKUMAR AMRUTLAL (D22MA005)**

**ERS**

**Research Area** : Queueing Theory

FPS

MUSKAAN SAINI (D24MA007)



Research Area : Queueing Theory



GANNAMANENI SAI CHARAN (D24MA011)

FIR

Research Area : Queueing Theory

Guide : Dr. Saroj R.Yadav



SAHU NAGESH SUMANSHANKAR (D21MA002)

FIR

Research Area : Fluid Dynamics

FIR

PATEL PAVAN KESHAVLAL (D22MA002)



Research Area : Scientific Machine Learning in Fluid Dynamics



UTSAV PATEL (D23MA011)

FIR

Research Area : Fluid Dynamics

Guide : Dr. Sourav Gupta



TAPAS MAL (D21MA001)

FIR

Research Area : Fluid Dynamics (Linear Water Waves)

FIR

MANSI GHANSHYAMBHAI BODAR (DS22MA001)



Research Area : Fluid Dynamics (Linear Water Waves)



**MAJETHIYA PRIYANKA ANIL KUMAR (DS23MA002)**

**ERS**

**Research Area** : Sampling and Reconstruction, Approximation Theory, Functional Analysis

**FIR**

**KRUTI VAYEDA (D24MA004)**



**Research Area** : Sampling Theory, Approximation Theory, Functional Analysis



**SANJUL MISHRA (D24MA012)**

**FIR**

**Research Area** : Sampling Theory and Approximation Theory



**Guru Preetham Lakkakula (I20MA001)** ✉ gurupreethamlakkakula@gmail.com

**Dissertation Title :** Conformal Mapping in Seepage Analysis and Stratified Flow Modeling

**Supervisor :** Dr. Ranjan Kumar Jana

**About the work :** This dissertation explores conformal mapping's applications in seepage analysis for symmetrical underwater tunnels and two-dimensional stratified flow modeling. It reviews literature on seepage fields, drainage systems, and stratified flows, then applies Schwarz-Christoffel transformations to solve Laplace equations for seepage around square tunnels. Results show accurate potential fields, with qualitative validation. Future work suggests refining boundary conditions and incorporating numerical methods.



**Rajarapu Mahesh (I20MA002)**

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**Dissertation Title :** Applications of Neural Network Operators in Image Processing

**Supervisor :** Dr. Shivam Bajpeyi

**About the work :** "This dissertation develops operator-theoretic neural network methods for image processing. We propose a constructive Gaussian-activated operator with proofs of evenness, monotonicity, and convergence, plus a Gaussian+B-spline hybrid. We benchmark Gaussian, sigmoidal, and Kantorovich operators for inpainting, decompression, and denoising, reporting PSNR/SSIM/EPI and analyzing computational efficiency (CPU vs GPU). Our results show task-dependent best choices: Gaussian excels at localized reconstruction and denoising; Kantorovich is robust for inpainting/decompression; sigmoidal offers stable baselines. Our work provides a rigorous framework and practical algorithms for high-quality, efficient reconstruction.



**Shruti N. Shah (I20MA003)**

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**Dissertation Title :** Radial Basis Function Method for Boundary Value Problems

**Supervisor :** Dr. Sushil Kumar

**About the work :** The study explores the application of non-symmetric Kansa's Radial Basis Function (RBF) method for solving boundary value problems, including second-order ordinary differential equations, elliptic partial differential equations (Laplace and Poisson equations), and time-dependent problems (heat equation). Unlike finite difference and finite element methods, RBF eliminates mesh generation. Using Gaussian RBF, numerical experiments in MATLAB 2024b demonstrate accuracy through comparisons of analytical and approximate solutions, with graphical representations confirming agreement between numerical and analytical results.



**Soumyadeep Mandal (I20MA004)**

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**Dissertation Title :** Local Class Field Theory Using Group Cohomology

**Supervisor :** Dr. Ramakanta Meher and Dr. Aprameyo Pal (*Harish Chandra Research Institute, Prayagraj*)

**About the work :** The goal of class field theory is to describe the abelian Galois extensions of a local or global field in terms of the arithmetic of the field itself. Necessary tools of the cohomology of groups are developed, which are mainly required to prove Tate's Theorem. Here, we are interested in zero characteristic local fields (or finite extensions of  $\mathbb{Q}_p$ ). Often, LCFT is considered a one-dimensional case of the Local Langlands program, which can be further studied.



**Pansuriya Tarang Bharatbhai (I20MA005)**

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**Dissertation Title :** Compound Optimal Design Strategy in Life Testing Under Type-I Hybrid Censoring for Generalized Exponential Distribution

**Supervisor :** Dr. Raj Kamal Maurya

**About the work :** This dissertation explores a smarter way to design product life testing experiments that save both time and money. Instead of testing every item until it fails, it uses hybrid censoring—stopping the test after a set time or number of failures. Unlike past studies that focused on either cost or accuracy, this work combines both using a balanced method called Compound Optimal Design. It uses the flexible Generalized Exponential distribution to better model how and when products fail.



**Abhijeet Bansod (I20MA006)**

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**Dissertation Title :** ESG and CSR Integration as Crisis-Resilient Investment Strategies

**Supervisor :** Prof. Neeru Adlakha and Dr. P. Sanjay (*Indian Institute Of Management Sirmaur*)

**About the work :** This thesis investigates the impact of ESG and CSR integration on corporate financial performance during the COVID-19 period. Using machine learning techniques, particularly neural networks, it analyzes how sustainability metrics influenced company resilience and investor confidence. The study leverages a multi-dimensional dataset covering financial indicators, ESG scores, and resource usage, offering data-driven insights into the evolving role of responsible business practices in times of crisis.



**Shaikh Khalid Shammi (I20MA008)**

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**Dissertation Title :** 3D Reconstruction and its Applications in Text to 3D Generation

**Supervisor :** Dr. Amit Sharma

**About the work :** Overview of 3D Reconstruction methods like Structure from Motion and Multi-view stereo along with deep learning based approach called Neural Radiance Fields (NeRFs). Text to 3D Generation using score distillation sampling which uses pre trained diffusion models for guiding the rendered images from a NeRF to generate a 3D object from a textual prompt.



**Gurram Mahipal (I20MA010)**

✉ mahipalgurram2002@gmail.com

**Dissertation Title :** Exploring Rational Series, Euler like constant and Riemann Zeta Function Representations

**Supervisors :** Prof. Ajay Kumar Shukla

**About the work :** This dissertation explores infinite rational series, Euler-like constants, and novel representations of the Riemann zeta function. Using partial fractions and residue techniques, it develops new finite, integral, and asymptotic representations. A unified framework for Euler-like constants is constructed via integrals and summations, yielding new constants and inequalities. The work also presents a double sum identity for the zeta function through harmonic and polygamma approximations. These results advance analytic number theory and special functions, with potential applications in physics, while offering deeper insights into the analytic behaviour of series and constants.



**Sanghavi Ishika Sandeep (I20MA011)**

✉ ishikasanghavi01@gmail.com

**Dissertation Title :** Consumer Shopping Trends: A PCA-Based Mathematical Approach

**Supervisors :** Dr. Twinkle R. Singh

**About the work :** This dissertation investigates consumer shopping trends using statistical and mathematical techniques, emphasizing feature extraction via Principal Component Analysis (PCA). The dataset was cleaned, normalized, and subjected to exploratory data analysis. Key categorical associations were tested using Chi-square analysis, while ANOVA tables evaluated significant differences across consumer groups. PCA was then applied to reduce dimensionality, uncover hidden patterns, and extract the most influential features driving purchase behavior. The results reveal significant factors affecting consumer choices, enabling segmentation and trend prediction. These insights support data-driven marketing, inventory optimization, and personalized recommendation systems, contributing to more efficient retail decision-making.

**Yerrapati Venkata Subbaiah (I20MA012)**

venkatasubbaiahvs2003@gmail.com

**Dissertation Title :** General Linear Lie algebra**Supervisors :** Dr. Shivam Bajpeyi and Prof. Manoj Kummini (*Chennai Mathematical Institute*)**About the work :** This dissertation introduces key concepts in differential geometry and Lie groups. It begins with smooth maps and the Inverse Function Theorem, which form the basis for understanding smooth spaces. The work then explores manifolds, tangent vectors, vector fields, flows, and the exponential map and finally I focused on Lie groups, examining their tangent spaces, left-invariant vector fields, and connections to Lie algebras.**Parmar Harsh Vinodbhai (I20MA013)**

✉ parmarharsh296385@gmail.com

**Dissertation Title :** Robust Reward-Risk Ratio Portfolio Optimization**Supervisors :** Dr. Indira P. Tripathi**About the work :** This thesis develops a portfolio optimization framework that integrates investor behavior with advanced reward-risk ratios. We first review classical portfolio theory and its mathematical foundations, then highlight how behavioral biases lead to deviations from traditional rational models. To capture return-risk trade-offs more realistically, we examine several ratios beyond the classical Sharpe Ratio, which assumes symmetric returns and overlooks downside risk. We study tail-sensitive and asymmetric measures such as the Omega Ratio, Semi-Mean Absolute Deviation (SMAD) Ratio, Stable Tail Adjusted Return Ratio (STARR), and Weighted STARR (WSTARR) Ratio, formulating and solving their associated optimization problems. Recognizing uncertainty in return distributions, we extend these models to robust frameworks, introducing robust versions of the Omega, SMAD, and WSTARR ratios via robust linear programming. Efficient solution is achieved with a cutting-plane algorithm suited to the non-smooth objectives of robust formulations. The thesis thus offers a comprehensive analysis of classical and robust portfolio optimization using advanced reward-risk metrics.**Chippakurti Shruthi (I20MA014)**

✉ shruthi.chippakurthi@gmail.com

**Dissertation Title :** Mathematical Modeling of Drying of Fish**Supervisor :** Dr. Saroj R. Yadav**About the work :** The drying process of food materials is an important subject in food engineering. In this dissertation, we study a thin-layer drying model for fish muscles using Fick's second law of diffusion. The governing partial differential equation is solved using the Differential Transform Method (DTM). Since the original initial condition leads to trivial solutions, we adopt a first-term approximation from the analytical solution as a modified initial condition. The results provide moisture ratio versus time curves at different temperatures, showing good agreement with expected drying behavior. This work demonstrates the applicability of DTM in food drying models.



**Abhishek Deshmukh (I20MA015)**

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**Dissertation Title :** Radons Transform and its Applications

**Supervisor :** Dr. Ranjan Kumar Jana

**About the work :** My thesis presents an in-depth study of the Radon Transform, its mathematical foundations, properties, and computational methods. Applications are explored in line detection, seismic imaging, astronomical imaging, and medical CT scanning, with a special focus on its role in image reconstruction and noise reduction. By connecting the Radon and Fourier transforms, the work highlights powerful tools for analyzing and processing multidimensional data. A case study on CT scanning demonstrates its practical impact, while future scope points toward advancements in imaging technologies and signal processing.



**Vankudothu Ramesh (I20MA017)**

✉ [vankudothuramesh1739@gmail.com](mailto:vankudothuramesh1739@gmail.com)

**Dissertation Title :** Mn/Mn/R/N Machine Repair Systems with State-Dependent Arrivals and Heterogeneous Service Stations

**Supervisor :** Dr. Sudeep Singh Sanga

**About the work :** This study examines an Mn/Mn/R/N machine repair system with N identical machines and R heterogeneous, unreliable servers under state-dependent arrivals and breakdown-repair dynamics. Two models are analyzed: Type 1 without reneging or balking, and Type 2 incorporating customer impatience (reneging) and exponential balking. Machine failures follow a Poisson process, while servers possess distinct service, breakdown, and repair rates. Steady-state probabilities are obtained using the matrix-analytic method to evaluate metrics such as availability, utilization, queue length, and failures. A composite cost function is optimized through the Quasi-Newton Method and Genetic Algorithm. Numerical validation demonstrates practical applications in manufacturing and healthcare.



**Kunjera Chetanbhai Dayabhai (I20MA018)**

✉ [chetan.kunjera15@gmail.com](mailto:chetan.kunjera15@gmail.com)

**Dissertation Title :** Effect of Dispersion and Advection on Solute Transport in Subsurface Environments

**Supervisors :** Prof. Vikas H. Pradhan

**About the work :** This study explores how pollutants move through soil and groundwater using numerical modeling. By applying finite difference techniques, it simulates the effects of advection and dispersion on solute transport. Different numerical schemes were tested for stability and accuracy, and results were validated with experimental data. The work highlights how soil type and flow direction influence pollutant spread, offering important insights for environmental monitoring and the development of more effective groundwater protection strategies.



**Gaurav Deepak Gupta (I20MA019)**

✉ guptagaurav2642@gmail.com

**Dissertation Title :** Dynamic Sharding and Performance Optimisation in Cloud Transaction Systems Using Queuing Theory and Universal Scalability Law

**Supervisor :** Dr. Sudeep Singh Sanga

**About the work :** This work proposes a dynamic, feedback-driven sharding mechanism designed to minimize contention ( $\alpha$ ) and coherence ( $\beta$ ) effects in parallel server models, as described by the Universal Scalability Law. By integrating queuing theory with a control-loop-based adaptive sharding strategy, the system adjusts shard configurations in real time based on load and coordination metrics. The approach is evaluated in the context of cloud infrastructure bottlenecks and is motivated by analogous challenges in financial transaction systems, where uncoordinated parallelism can increase systemic risk under high transaction volumes. Simulation results demonstrate improved parallel performance and cost-efficiency relative to static sharding approaches.



**Dharmik Patel (I20MA020)**

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**Dissertation Title :** A Study and Modification of the PC Algorithm for Constraint-based Causal Discovery

**Supervisor :** Dr. Raj Kamal Maurya and Dr. Stephan Eckstein (*University of Tübingen*)

**About the work :** Constraint-based Causal discovery is significantly affected by Conditional Independence testing. In this study, we present a possible modification in the PC-Algorithm by using novel Conditional Independence test statistics.



**Sauparnika Nair (I20MA021)**

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**Dissertation Title :** Airline Scheduling Optimization: Metaheuristic Methods and Mathematical Modelling

**Supervisor :** Dr. Ranjan Kumar Jana

**About the work :** This thesis addresses the airline scheduling challenge by optimizing flight-to-aircraft assignments to minimize delays and operational costs. The study formulates the fleet assignment problem as a mathematical model and implements four distinct optimization techniques: Integer Linear Programming (ILP), a custom heuristic, a Genetic Algorithm (GA), and Simulated Annealing (SA). A comparative analysis of these methods reveals critical trade-offs. The heuristic method provided the fastest solution, making it ideal for real-time adjustments. While ILP guaranteed an optimal solution, its high memory usage makes it less scalable. SA offered a balanced performance in speed and solution quality, proving more efficient than the slower GA. The findings underscore the practical advantages of heuristic and SA methods for large-scale, dynamic airline scheduling.



**Dhanani Jatinbhai (I20MA022)**

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**Dissertation Title :** Enhancing Portfolio Optimization through Advanced Clustering Techniques: A Comparative Study of IKL, DKL, Spectral, and Bi-clustering Approaches

**Supervisor :** Dr. Shailesh Kumar Srivastava, and Dr. Sundar Rengasamy (*Indian Institute of Management Jammu*)

**About the work :** This study enhance the Hierarchical Risk Parity (HRP) portfolio method by incorporating graph-based clustering techniques—Spectral Clustering, Integrated K-means Laplacian, Discriminative K-means Laplacian, and Spectral Biclustering. These methods aim to identify more representative asset groupings by capturing complex, nonlinear relationships. Empirical analysis on S&P 500 constituents (2010–2023) evaluates portfolio performance across standard metrics, including Sharpe Ratio, Treynor Ratio, and Jensen’s Alpha, demonstrating improved robustness and coherence in asset allocation over HRP.



**Siddarth Sreevatsa (I20MA024)**

✉ sidtintin@gmail.com

**Dissertation Title :** Topology of Point Clouds: From Simplicial Complexes to Persistent Homology

**Supervisors :** Dr. Amit Sharma

**About the work :** This dissertation investigates the theoretical foundations of Topological Data Analysis (TDA), a modern approach to understanding the shape and structure of complex datasets using tools from algebraic topology. Central to this study is the concept of persistent homology, which tracks topological features—such as connected components, loops, and voids—across multiple spatial scales. Key constructions like simplicial complexes, filtrations, and homology groups are rigorously developed, leading to topological summaries such as persistence diagrams and barcodes.



**Ninad Joshi (I20MA025)**

✉ ninadjoshi382@gmail.com

**Dissertation Title :** Style Based Data Attribution for Diffusion Models

**Supervisor :** Dr. Amit Sharma and Vivek Shrivastava

**About the work :** The problem of data attribution deals to quantify the contribution of each training sample in the deep learning model’s output. We try to attribution on the basis of finer scale attributes such as color and shape. For a pretrained Diffusion model (text to image), based on the output image’s color and shape, we identify and quantify the contribution of training data samples.



**Parmar Unnatiben Sureshbhai (I20MA026)** ✉ [unnatiparmar1601@gmail.com](mailto:unnatiparmar1601@gmail.com)

**Dissertation Title :** Mathematical Modeling of Drying Fruits

**Supervisor :** Dr. Saroj R. Yadav

**About the work :** This study presents a mathematical model to examine heat and mass transfer during the convective drying of fruits. The governing differential equations were solved using the Differential Transform Method to obtain approximate analytical solutions. Temperature and moisture variations within the drying medium were analyzed. The results were compared with existing literature to validate the model's accuracy. This work contributes to a deeper understanding of drying processes and may support the development of improved methods in food preservation technology.



**Adarsh Kumar (I20MA027)** ✉ [userid.akumar18@gmail.com](mailto:userid.akumar18@gmail.com)

**Dissertation Title :** A Study on Numerical Approach of Finite Difference Method for Predicting Pressure Distribution in Petroleum Reservoir

**Supervisor :** Prof. Vikas H. Pradhan

**About the work :** In this thesis work, we aimed to predict how the pressure during the extraction of petroleum varies with time, when we extract petroleum. We have used Numerical techniques such as Finite Difference method because it is easier and less complicated, easy to code in matlab as compared to the finite element method or finite volume method. We have predicted the pressure distribution in 1D, 2D, 3D reservoir under the assumption such as single phase flow, mildly compressible, uniform flow in direction and validated using the CMG software.



**Fatema Maksood Bhatt (I20MA028)** ✉ [fatema23maths@gmail.com](mailto:fatema23maths@gmail.com)

**Dissertation Title :** Fractal Analysis in Financial Markets

**Supervisor :** Dr. Twinkle R. Singh

**About the work :** This dissertation explores the application of fractal analysis in financial markets, a field that bridges the gap between the abstract world of mathematical theory and the complex, dynamic nature of financial systems. Traditional models based on assumptions of normality and randomness have been found insufficient in capturing the true complexity of financial data. In response to these limitations, fractal geometry provides a more robust framework for understanding market behavior, revealing patterns of self-similarity, long-range dependence, and multifractality.



**Urmik Bhavsar (I20MA029)**

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**Dissertation Title :** Portfolio Optimization using Multi-objective Optimization.

**Supervisor :** Dr. Jayesh M. Dhodiya

**About the work :** This thesis explores multi-objective optimization in portfolio management, focusing on balancing risk and return. It begins with fundamental concepts of optimization, portfolio theory, and financial metrics like variance, covariance, and expected return. Various methods to solve multi-objective problems, including weighted-metric and fuzzy programming approaches, are discussed. The Markowitz mean-variance model is formulated and applied with data, highlighting its limitations and advantages. The study then introduces the Mean-Absolute Deviation-Entropy model as an alternative, emphasizing its effectiveness in handling uncertainty. Results and comparisons of both models are analyzed, followed by conclusions and recommendations for future research in portfolio optimization.



**Maurya Rahul Kailash (I20MA030)**

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**Dissertation Title :** Multi-task Differentially Private Federated Learning for Turbofan Engine Degradation Data Set

**Supervisor :** Dr. Raj Kamal Maurya, and Dr. Tanmay Sen (*Indian Statistical Institute Kolkata*)

**About the work :** In this study, we investigated various machine learning approaches for predicting the Remaining Useful Life (RUL) of turbofan engines and failure classification. We compared Centralized Learning, Differentially Private Centralized Learning, Federated Learning, and its private counterpart. Federated Learning outperformed others by enabling collaborative training without sharing raw data. Adding Differential Privacy introduced a minor accuracy drop but improved privacy. Our results demonstrate Federated Learning's practical value in privacy-preserving predictive maintenance for real-world industrial applications.



**Satyam Singh (I20MA031)**

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**Dissertation Title :** Transient Analysis of a Finite Queue

**Supervisor :** Dr. Sudeep Singh Sanga

**About the work :** This thesis models hospital emergency departments using an  $M/M/1/K$  queue to address congestion under resource constraints. By simulating transient behavior in MATLAB, it evaluates the impact of arrival and service rates on patient flow. Key metrics, such as waiting time and system occupancy, guide optimal staffing and capacity decisions. The results show that increased service rates significantly reduce delays, offering a practical, cost-aware tool for improving health-care efficiency through mathematical modeling.



**Sahina Mithani (I20MA032)**

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**Dissertation Title :** Multidimensional Insights into Educational Quality

**Supervisor :** Dr. Saroj R. Yadav and Dr. Jayesh M. Dhodiya

**About the work :** This study explores educational quality through biophilic environments, ANFIS, teacher-student relationships, and socio-environmental factors. Biophilic designs enhance cognition and well-being, while ANFIS predicts performance using multidimensional inputs. Teacher-student bonds foster belonging, and analysis of 1,000 students links outcomes to gender, study hours, and parental involvement. Faculty performance is assessed using fuzzy logic, enabling nuanced interpretation of feedback. This inclusive approach improves fairness, accuracy, and transparency beyond traditional methods.



**Vennela Vinay Kumar (I20MA033)**

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**Dissertation Title :** A Marker-Controlled Watershed Segmentation using Edge Skeletonisation

**Supervisor :** Dr. Sushil Kumar

**About the work :** We developed a complete image segmentation pipeline and image restoration methods. Implemented various image restoration algorithms - inpainting algorithm for reconstruction of small missing and damaged portions of images using Open CV libraries in python.



**Dushyant (I20MA034)**

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**Dissertation Title :** Approximation Using Neural Network

**Supervisor :** Dr. Shivam Bajpeyi

**About the work :** This work focuses on quasi-interpolation of continuous functions using neural network operators activated by the Softplus function. This work explores approximation properties and operator construction through Softplus-induced density functions. This combines classical approximation theory with modern neural network frameworks, contributing to the theoretical foundation of neural function approximation.



**Athul Raj K. (I20MA035)**

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**Dissertation Title :** Formally Verified Response-Time Bound for ELF scheduling

**Supervisor :** Dr. Sourav Gupta, and Dr. Björn B. Brandenburg (*Max Planck Institute for Software Systems*)

**About the work :** This thesis presents a formal response-time analysis for ELF scheduling, a policy we introduce as a general framework that subsumes many existing real-time scheduling algorithms. The primary contribution of this work is the derivation of a sound and formally verified response-time bound for the ELF scheduling policy. To ensure high assurance and correctness, the analysis is carried out within a mechanized proof framework, leveraging formal verification tools to eliminate ambiguity and human error common in traditional schedulability analysis.



**Shivkesh Meena (I20MA036)**

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**Dissertation Title :** Dengue Transmission Dynamics in India: A SEIR Model Approach

**Supervisor :** Dr. Sushil Kumar

**About the work :** This study focuses on understanding dengue transmission in India using a mathematical SEIR (Susceptible-Exposed-Infectious-Recovered) model. The model explains how dengue spreads among humans through mosquitoes and helps predict outbreak patterns. Both numerical methods (Euler and Runge-Kutta) and analytical solutions were used, and their accuracy was compared. Results showed that the Runge-Kutta method provided more reliable predictions than Euler. The model highlights how infection peaks around 30-40 days and stresses the importance of early control measures. Although simplified, this research offers insights for public health planning and suggests future improvements, such as including seasonal, spatial, and vector factors.



**Amit Halder (I20MA037)**

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**Dissertation Title :** Limit Relationships Between Hermite and Laguerre Polynomials and Their Applications

**Supervisor :** Prof. Ajay Kumar Shukla

**About the work :** This dissertation is about the mathematical relation between Hermite and Laguerre polynomials through well-defined limit theorems and scaling transformations. It further applies these relationships to the quantum harmonic oscillator, illustrating how Hermite polynomials arise as limiting cases of radial solutions in spherical coordinates and analyzing their role in normalization, probability densities, and perturbative approximations. The work emphasizes both the theoretical significance and practical applicability of these polynomials in mathematical physics.



**Podili Mohammed Imran (I20MA038)**

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**Dissertation Title :** Mathematical Modeling of Hepatitis C with Comorbidity

**Supervisors :** Prof. Neeru Adlakha

**About the work :** The dissertation presents a mathematical model of Hepatitis C Virus (HCV) infection with comorbidity from Type 2 Diabetes (T2D). Using a system of nonlinear ordinary differential equations, the model incorporates healthy and infected hepatocytes, viral load, T-cell immune response, and a diabetes index. Analytical results establish positivity, boundedness, reproduction number, and disease-free equilibrium. Numerical simulations and sensitivity analysis demonstrate how diabetes exacerbates viral persistence and weakens immune defense. The study provides a theoretical framework linking virological, immunological, and metabolic processes, offering insights into comorbidity dynamics and potential strategies for disease management.



**Hemant Kumawat (I20MA039)**

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**Dissertation Title :** Next Day Bitcoin Price Prediction Using ML/DL/Statistical Models and Independent On-chain and Sentiment Analysis of Market Indicators

**Supervisor :** Dr. Jayesh M. Dhodiya

**About the work :** This study predicts Bitcoin prices using machine learning and statistical models trained on historical data from BTC, ETH, BNB, and USDT. It also examines the influence of halving events, whale transactions, and sentiment indicators, such as the Fear and Greed Index, on market volatility. The insights are valuable for hedge funds, investment banks, proprietary trading firms, and high-frequency trading desks, enabling them to enhance their real-time trading and portfolio strategies.



**Tirumandyam Saiteja (I20MA041)**

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**Dissertation Title :** Mathematical Model for Seasonal Transmission of Nipah Virus

**Supervisor :** Prof. Neeru Adlakha

**About the work :** The Nipah Virus, with its severity, high fatality rates and lack of vaccination, continues to be a critical global concern. In Malaysia, 1999 the first outbreak was recorded, and since then, several outbreaks have been reported in South and Southeast Asia. This dissertation mainly focuses on mathematical modeling applied to Nipah Virus, direct and indirect virus transmission of virus and annual seasonal outbreaks. The motive is to study transmission ways and the influence of season on Nipah Virus outbreaks.



**Bommu Chakravarthi (I20MA042)** ✉ [bommuchakravarthisvnit@gmail.com](mailto:bommuchakravarthisvnit@gmail.com)

**Dissertation Title** : Comparative Analysis of Population Growth in Selected Countries Using Exponential, Logistic, and Least Squares Mathematical Models

**Supervisor** : Dr. Indira P. Tripathi

**About the work** : Mathematical Modeling of different countries population growth using Exponential Growth Model, Logistic Growth Model, Least Square Method and Arithmetic Average of Logistic and Exponential Growth Model and Comparative analysis of the models.



**Bosmiya Aman Rajubhai (I20MA043)** ✉ [amanbosmiya@gmail.com](mailto:amanbosmiya@gmail.com)

**Dissertation Title** : Laguerre Polynomial and It's Applications

**Supervisor** : Prof. Ajay Kumar Shukla

**About the work** : Discussed the popular hydrogen atom and its relation with Laguerre Polynomials



**Raj Kumar Sah (I20MA045)** ✉ [rajkumarshah293@gmail.com](mailto:rajkumarshah293@gmail.com)

**Dissertation Title** : A Study on Spectral Collocation Method with its Applications

**Supervisor** : Dr. Ramakanta Meher

**About the work** : This dissertation explores the spectral collocation method and its applications in solving partial differential equations (PDEs). Beginning with the classification of PDEs and boundary conditions, it introduces the generalized collocation method and its effectiveness in handling nonlinear problems, demonstrated through traffic flow modeling. The study then focuses on spectral collocation, highlighting its use of global basis functions and Chebyshev–Gauss–Lobatto nodes to achieve high accuracy and stability. A comparative analysis with other collocation methods underscores its efficiency in tackling complex, nonlinear systems. Overall, the work establishes spectral collocation as a powerful, reliable, and versatile numerical tool for applied mathematics and engineering.



**Mahesh Kumar (I20MA046)**

✉ sharmahesh99820@gmail.com

**Dissertation Title :** A Study on Nonlinear Diffusion Model Using Spectral Collocation Method

**Supervisor :** Dr. Ramakanta Meher

**About the work :** This dissertation investigates numerical solutions for nonlinear diffusion models using spectral collocation methods. It formulates well-posed initial-boundary value problems, employing Chebyshev-Gauss-Lobatto nodes and barycentric Lagrange interpolation to construct spectral differentiation matrices. The generalized and spectral methods are applied to convection-diffusion equations with Neumann conditions. Numerical results confirm exponential convergence and robust stability. A comparative analysis demonstrates the spectral method's superior accuracy for smooth problems, establishing it as an effective tool for solving complex nonlinear PDEs in applied mathematics.



**Chandan Saraf (I20MA047)**

✉ sarafchandan10@gmail.com

**Dissertation Title :** Analysis of Mathematical Models and Simulation in Finance

**Supervisor :** Dr. Twinkle R. Singh

**About the work :** We analysed different mathematical models and simulations, such as Black Scholes, Gordon growth model, ARIMA, Monte Carlo, etc, to predict the price of options in the stock market. The data was simulated using Maple, Python and MATLAB.



**Pawan Meena (I20MA048)**

✉ pawanair25@gmail.com

**Dissertation Title :** Solution of Fractional SIR Epidemic Model Using Fractional Euler Method

**Supervisor :** Dr. Sourav Gupta

**About the work :** We analysed fractional order differential equations within the context of epidemic modelling and interpreted their numerical and graphical solutions.



**Rohit Rai (I20MA051)**

✉ rohitrail342000@gmail.com

**Dissertation Title :** A Study on Rational Trigonometric Approximations Using Fourier Series Partial Sums

**Supervisor :** Dr. Shailesh Kumar Srivastava

**About the work :** A Study on Rational Trigonometric Approximations Using Fourier Series Partial Sums, introduces Fourier-Padé approximations, which enhance Fourier series by integrating rational functions. The work addresses challenges like slow convergence and Gibbs phenomenon in traditional Fourier methods. It demonstrates improved accuracy in approximating periodic functions and solving differential equations. This approach has significant implications in mathematical physics and engineering, promising advancements in numerical analysis and practical applications, especially in areas requiring high-precision spectral methods.



**Prashant Shrivastava (I20MA052)**

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**Dissertation Title :** Unsupervised Statistical Classification of Natural Language

**Supervisor :** Dr. Sourav Gupta

**About the work :** This work proposes a balanced approach combining classical unsupervised methods with modern enhancements for efficient text classification and model fine-tuning. It emphasizes transparency and speed over black-box models, offering a lightweight, interpretable alternative suited for real-world use. Focusing on general text segregation—ranging from stereotypical discrimination on online platforms to broader organizational needs—we introduce a statistical model that is both fast and reasonably accurate, addressing deployment constraints where labeled data is scarce but improved performance is necessary.



**Mortha Rajesh (I20MA054)**

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**Dissertation Title :** Optimization of Multi-Objective Airport Gate Assignment Problem by NSGA-III

**Supervisor :** Dr. Indira P. Tripathi

**About the work :** The Airport Gate Assignment Problem (AGAP) focuses on efficiently allocating aircraft to available gates at airports, considering a range of operational and commercial restrictions. This research presents a multi-objective optimization model for AGAP, aiming to reduce aircraft taxiing costs and passenger walking distances. Additionally, it incorporates fairness in gate allocation across different airlines. To tackle this complex problem, we introduce the NSGA-III algorithm, which utilizes a reference-point-based evolutionary framework to effectively explore high-dimensional Pareto-optimal solutions. A case study conducted at Nanjing Lukou International Airport demonstrates that the proposed method delivers superior performance in terms of convergence and solution diversity when compared to existing approaches.



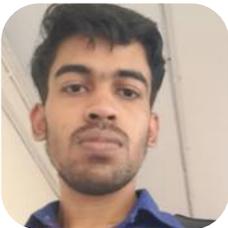
**Rajveer Singh (I20MA056)**

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**Dissertation Title :** Enhanced Fuzzy Optimization for University Course Scheduling with Stakeholder Satisfaction

**Supervisor :** Dr. Shailesh Kumar Srivastava

**About the work :** This thesis develops an enhanced fuzzy optimization model for university course scheduling that balances faculty, administrator, and student preferences under real-world constraints. The model integrates faculty time-slot choices, course difficulty, workload equity, and idle-time minimization, using double-parametric fuzzy logic with exponential membership functions to convert vague inputs like student feedback into actionable scheduling objectives. Implemented in MATLAB and tested on synthetic data, the approach achieved 76.44% faculty satisfaction, 88.00% administrator satisfaction, and 38.00% student satisfaction with reduced idle time. The framework provides tunable, Pareto-optimal solutions, offering institutions a scalable, fair, and practical scheduling tool



**Deepak Singh (I20MA060)**

✉ i20ma060@amhd.svnit.ac.in

**Dissertation Title :** Multi-Objective Portfolio Optimization of Top Indian Gold Stocks

**Supervisor :** Dr. Jayesh M. Dhodiya

**About the work :** This study introduces a multi-objective Mean–Absolute Deviation–Entropy (MADE) model for gold-stock portfolio optimization, integrating entropy maximization with risk–return trade-offs to enhance diversification. Comparative analysis with traditional MAD, naïve  $1/N$ , and fuzzy models shows MADE and fuzzy approaches deliver superior risk-adjusted returns, particularly under market volatility. Incorporating LSTM-based forecasts further improves adaptability. Results confirm that combining entropy and fuzzy optimization yields robust, high-performing portfolios surpassing conventional methods in both stable and uncertain market conditions.



**Adarsh Kumar (I20MA061)**

✉ adarshkumar1972k@gmail.com

**Dissertation Title :** Numerical Simulation of Richard's Equation using Crank–Nicolson Finite Difference Method and its Validation with HYDRUS-ID Software Tool

**Supervisor :** Prof. Vikas H. Pradhan

**About the work :** This dissertation explores the simulation of unsaturated water flow through soils using Richards' equation, a pivotal tool in hydrology and environmental engineering. This thesis presents a comprehensive analysis of unsaturated soil–water dynamics by considering various soil hydraulic parameters and boundary conditions. The work is structured to progressively build the reader's understanding—from the theoretical foundations of water flow to the practical application of HYDRUS-ID for simulating infiltration and retention behavior across different soil types.



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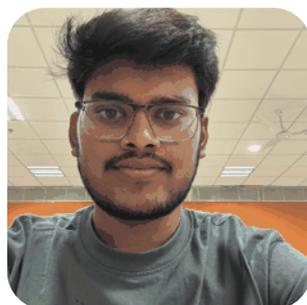
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Akshat Kumar  
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Aslam Ansari  
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Shalini D Pandey  
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Pal Manish Mangaru  
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Sunil Kumar  
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Anapana Bharat Reddy  
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Trivedi Rajkumar  
Jitendrabhai  
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Der Payal Hebhabhai  
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Pandey Amritanshu Umesh  
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Raj Kumar  
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Surya Pratap Yadav  
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Peddinti Seshunadh Tanuj  
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Suraj Kr Mishra  
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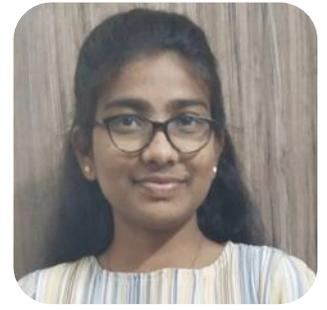
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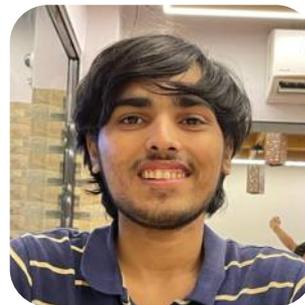
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Mahla Vishalbhai  
Prakashbhai  
I22MA067



Rahul Ahirwar  
I22MA068



Sukhda Baruna  
I21MA052

## Mini Project Details of 3<sup>rd</sup> Year

Name	Title	Guide
Harsh Kumar Mishra (I22MA059)	Machine Learning-Driven Portfolio Optimization: Prediction and Optimization	Dr. Indira P. Tripathi
Sunil Kumar (I22MA025)		
Patel Drashti Mukeshbhai (I22MA039)		
Priya Patel (I22MA011)	A Study On Multi-Server Queue With an Admission Control Policy	Dr. Sudeep Singh Sanga
Smruti Bhalodiya (I22MA013)		
Tanmay Anil Baviskar (I22MA028)		
Parthivi Jain (I22MA014)	AI Enhanced Cryptographic Protocol for Battlefield Communication	Dr. Amit Sharma
Surya Pratap Yadav (I22MA044)		
Der Payal Hebhabhai (I22MA035)		
Mangukiya Raj (I22MA004)	Apple Stock Price Prediction Using RandomForest and Gradient boosting	Dr. Sourav Gupta
Tanishk Varshney (I22MA031)		
Priyanshu Kumar (I22MA017)		
Abhijeet Kumar (I22MA057)	Apple Stock Price Prediction Using Time Series Analysis	Dr. Twinkle R. Singh
Pallav (I22MA052)		
Sudhanshu Kumar (I22MA056)		
Rohit Kumar (I22MA066)	Application of Group Theory in Crystallography	Dr. Ranjan Kumar Jana
Rahul Ahirwar (I22MA068)		
Mohit Raj (I21MA015)		
Peddinti Seshunadh Tanuj (I22MA045)	Audio Reconstruction Through Kantorovich Type Sampling Series	Dr. Shivam Bajpeyi
Banoth Manikanta (I22MA043)		
Sanjay Kumar (I22MA049)		
Adarsh Krishnanand Tiwari (I22MA008)	BHAVNA: A Fuzzy Set Based Framework for Sentiment Analysis of Digital Text	Dr. Jayesh M. Dhodiya
Patil Mahavir Sunil (I22MA003)		
Choudhary Manish (I22MA005)		
Tadela Sai Chandu (I22MA019)	Big Mart Sales Prediction Using Xgboost Algorithm	Dr. Shivam Bajpeyi
Pachimatla Dinesh Kumar (I21MA031)		
Sachin Jat (I22MA018)		
Avinash Raj (I22MA048)	Comparative Study of Image Denoising Techniques and Designing of an Adaptive Fuzzy Filter	Dr. Ramakanta Meher
Lunasiya Kishan Pravinbhai (I22MA063)		
Suvagiya Vaibhav Mukeshbhai (I22MA015)		
Chandra Pratap (I22MA062)	Designing a Shortest-path Algorithm for Large-scale Graphs	Dr. Sushil Kumar
Abhinav Kumar (I22MA023)		
Raj Kumar (I22MA038)		
Aman Tiwari (I22MA051)	Fraud Prediction in Vehicle Loan Using Machine Learning Through Various Standard Model	Prof. V. H. Pradhan & Dr. Ritu Tiwari (DoAI)
Manish Raj (I22MA060)		
Suraj Kr Mishra (I22MA046)		
Sukhda Baruna (I21MA052)	Fundamentals of Cryptography	Dr. Shailesh Kumar Srivastava
Balgari Ruchitha (I22MA050)		
Guguloth Sangeetha (I22MA036)		
Aryan Singh (I22MA021)	Mathematical Modelling of Transport in Porous Media	Dr. Saroj R. Yadav
Lalit Mohan Deval (I22MA030)		
Limbachiya Yashkumar Mukeshbhai (I22MA064)		
Moti Singh (I22MA026)	Pythagorean Hesitant Fuzzy Theory for Portfolio Optimization	Dr. Saroj R. Yadav
Om Bharatkumar Panchal (I22MA040)		
Shrinivas Karekar (I22MA022)		
Shrishti Malhotra (I22MA002)	Q-learning for Intuitive Intraday Trading Strategies	Dr. Indira P. Tripathi
Varun Samdani (I22MA020)		
Ansh Gupta (I22MA009)		
Gambhir Aditya Sandip (I22MA027)	Room Allocation Problems	Dr. Raj Kamal Maurya
Bhavik Dodda (I22MA007)		
Mandapaka Harini (I22MA010)		
Poojita Mukundan (I22MA001)		

Name	Title	Guide
Pandey Amritanshu Umesh (I22MA037)	Some Facts of Complex Numbers	Prof. A. K. Shukla
Pal Manish Mangaru (I22MA024)		
Prajapati Abhishek Radheshyam (I22MA042)		
Trivedi Rajkumar Jitendrabhai (I22MA032)	Strategic Interactions and Mathematical Analysis of PCOD/PCOS	Prof. Neeru Adlakha
Trivedi Tirthkumar (I21MA018)		
Patel Nirdeshkumar Mukeshbhai (I21MA040)		

# Integrated Master of Science (Mathematics) 2<sup>nd</sup> Year (Int. M.Sc. Class of 2028)



Priyansi  
I23MA001



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I23MA004



Vrushti Hirenbhai Doshi  
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Makwana Darshankumar  
Jitubhai  
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Aniket Chaudhary  
I23MA008



Nischal Gupta  
I23MA009



Brijesh Patel  
I23MA010



Rwdwm Boro  
I23MA011



Aditya Chandra Das  
I23MA012



Aman Jaiswal  
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Herryng Patel  
I23MA014



Khushi Brij Kishor  
I23MA015



Kajal Kumari  
I23MA016



Nikhil  
I23MA017



Nitin Kumar  
I23MA018



Sudipta Bala  
I23MA019



Rana Harendra Prakash  
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Kaushik Kumar  
I23MA021



Abhinav Tomar  
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Rishi Raj Anand  
I23MA023



Anmol Kumar Srivastav  
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Abhinav Upadhyay  
I23MA025



Shubham Kumar  
I23MA026



Shubham Jaiswal  
I23MA027



Shubham Kumar  
I23MA028



Shashi Bhushan Kanishk  
I23MA029



Maharshee Kalpeshkumar  
Shah  
I23MA030



Rohan Raj Singh  
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John Jaya Paul Reddy  
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Harsh Thakkar  
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Riyansh Bharti  
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# Integrated Master of Science (Mathematics) 1<sup>st</sup> Year (Int. M.Sc. Class of 2029)



Ramavath Akhil  
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Aarushi Mishra  
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Burabhathula Abhiram  
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Akash Reddy  
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Ankit Jaat  
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Korra Anil Naik  
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Harshil Katpara  
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Dubey Adarsh  
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Suthar Hastinkumar  
Hardikbhai  
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Jannimarri Meghanadh  
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Padhiyar Jwal M.  
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Vicky Satish Kamble  
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Aryan Khatak  
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Mehul Jindal  
I24MA024



Vinit Sharma  
I24MA025



Raval Dhartiben Mukeshbhai  
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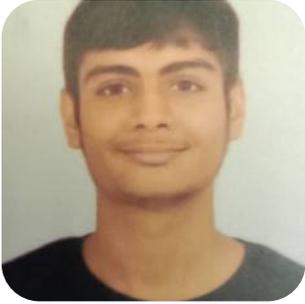
Samyak Suresh Shende  
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Harsh Kulhari  
I24MA028



Edara Jishnu Priya  
I24MA029



Jain Swapnil Sunil  
I24MA030



Ritesh Tiwari  
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Ronak Nayak  
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Pranjal Shaileshkumar  
Vaghela  
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Mandeep Kumar  
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Parag Patle  
I24MA035



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Patel  
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Sarthak Sandipan Sangale  
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Suhani Singh  
I24MA038



Goru Karthik Srinivas  
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Indrajeet Vikram Singh  
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Mehal Dipeshkumar Sejjal  
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Sutariya Tirth Vijaykumar  
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Medpalliwar Aditya Prashant  
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Aryan Sehra  
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Radadiya Brij Mahendrabhai  
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Nindra Navadeep  
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Rohit Prajapat  
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Mohit Yadav  
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Marakana Shreykumar  
Rajeshbhai  
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Patel Mayank Sushil Kumar  
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Shree Satyam Pastagia  
U24MC011



Bhankhodia Devanshi  
Khimjibhai  
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Aniket Chellamal Harwani  
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Gandhi Dev Vijaybhai  
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Ved Sandeep Sen  
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Yashvi Agarwal  
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Tarachand Meghwal  
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Gamit Jignalkumar  
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Makvana Heet Nileshbhai  
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Kava Dimpal Sanjaykumar  
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Ayush Roy  
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Nageshi Samarth Nagnath  
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Sarvaiya Jaimin Nareshbhai  
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Jetani Devam Rajeshbhai  
U24MC025



Kalsariya Prince Ashokbhai  
U24MC026



Pooja  
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Astha Ahirwar  
U24MC028



Shinde Rushiraj Shivaji  
U24MC029



## भ्रष्टाचार का गीत

भ्रष्टाचार की बात छिड़ी,  
ध्यान दें, ये केवल धन का खेल नहीं,  
कभी विचारों का कलुषित होना,  
या नीतियों की पतित राहें भी होती हैं यहाँ।

(सरकारी संस्थान)

तो बात छिड़ी है, भ्रष्टाचार की,  
आइए कराते हैं, इसका मिलन हमारी  
शिक्षा पद्धति से,  
आया था, एक बच्चा बहुत कठिन परीक्षा देकर,  
घर वालों का मान सम्मान बढ़ा कर,  
लिया प्रवेश उसने देश की प्रतिष्ठित संस्थान में,  
फिर उसने पढ़ाई करी पूरे मन से, कर्म से, लगन से,  
चंद दिनों बाद, पता नहीं क्या हुआ,  
उस खूबसूरत प्रांगण में उसका मन घटुने लगा,  
और फिर एक दिन, पंखे में झूल गया,  
देश की वही प्रतिष्ठित संस्थान ने,  
अयोग्य छात्र की उपाधि दी,  
और वापस से फिर बिना अपनी कमियां सुधारे,  
वर्ल्ड रैंकिंग के पीछे भागी।।

(निजी संस्थान)

फिर बात करूंगा भ्रष्टाचार की,  
तो तुम्हें(सरकार) ज्यादा समझ आएगी नहीं,  
क्योंकि पिछली रात वो तो अस्पताल अकेले आई थी,  
उसने भी बड़े मन से करी पढ़ाई थी,  
और वहां डॉक्टर बनकर आई थी,  
पता नहीं कहां से कई असुर आए,  
की आज सबुह उसकी खनू से सनी जर्सी आई।।

फिर बात करूंगा भ्रष्टाचार की,  
गांव, शहर के बच्चे थे,  
मां बाप के आंखों के तारे थे,  
खेत बेच कर IAS बनने बड़े शहर आए थे,  
बड़े शहर की बड़ी सी कोचिंग थी,  
जिसे केवल अपनी आमदनी ही प्यारी थी,  
फिर क्या होना था,  
एक दिन बारिश ने अपना खेल दिखाया,  
और IAS बनने आए बच्चों ने अपना जीवन खोया।।

अंत में एक सवाल, जो दिल को चीर दे,  
जब शिक्षा समाज का सुधारक है,  
तो इसमें भ्रष्टाचार का दीमक क्यों ?  
क्या हम नहीं चाहते एक उज्ज्वल भविष्य,  
जहां ज्ञान हो शुद्ध, और हो हर एक कण का मूल्य ?

रवि शंकर प्रसाद  
(शोध छात्र (द्वितीय वर्ष)  
गणित विभाग)





## हर कदम पर हल मिलेगा !

Joshi Nikunj K.

जब मैं जन्मा, शून्य था मैं,  
न कोई आकार, न कोई गुण — खुद से अनजान मैं।  
पर माँ-बाप ने बनाया पहला समीकरण,  
प्यार और संस्कार से सजा मेरा जीवन।

पढ़ाई शुरू हुई, किताबें थाम के,  
A for Apple से आए दिन राम के।  
Counting सीखी 1, 2, 3, 4  
Table याद करते थे, दिनभर ठोकर खा के ज़ोर।

फिर आया L.C.M. और H.C.F. का दौर,  
Fractions और Decimals ने दिमाग को घेर लिया घोर।  
कभी जोड़-घटाना, कभी गुणा-भाग,  
क्लास 5 तक यही था हमारा राग।

फिर Algebra ने मारा झटका,  
x और y ने भेजा दिमाग का टुकड़ा।  
Geometry के Circle और Triangle से हुआ प्यार,  
कभी Compass तो कभी Protractor बना हथियार।

फिर आया Trigonometry का Twist,  
sin  $\theta$ , cos  $\theta$  ने लिया बड़ा Risk।  
Board Exams के Probability वाले डर,  
पर सपनों को थामा, न मानी हार।

Calculus ने दिखाया नया आसमान,  
Limits, Derivatives और Integration का जहान।  
कभी Maxima, कभी Minima, कभी खोला Graph,  
पर ज़िंदगी के Function को रखा Always Half!

Graduation में Matrices और Vectors का सहारा,  
पढ़ाई तो जारी थी, पर Confusion ने मारा।  
फिर आया एक मोड़, जब मैं भटका,  
हार और असफलता ने मन को झटका।

कई हार के बाद, जब गुरु ने राह दिखाई,  
Portfolio Optimization की गहराई समझाई।  
उन्होंने कहा — “Risk और Return का खेल सीखो,  
Constraints को Balance कर, Solutions लिखो।”

उन्होंने कहा — “गणित केवल सवाल का हल नहीं,  
यह है जीवन का दर्शन, जो हर अंधकार मिटा दे कहीं।”  
“Portfolio Optimization को समझ,  
यह गणित तेरे सपनों को देगी नई मंज़िल।”

फिर मैंने सीखा Risk और Return का खेल,  
Constraints, Objectives और Weights का मेला।  
हर Calculation में छुपा था नया सपना,  
हर Graph ने दिया दिल को सुकून सा अपना।

PhD के सफर में कितनी रातें जागी,  
हार के पल भी थे, जब उम्मीदें भागी।  
पर गुरु की वो बात दिल में बसी,  
“हर Problem में छिपी है Success की कली।”

Portfolio बना, Optimization हुआ,  
Life भी जैसे एक Balanced Fund बना।  
Tension और Depression ने हार मान ली,  
अब बस है मंज़िल की पूरी तैयारी।

शुरुआत हुई थी शून्य से मेरे यार,  
गणित ने ही बनाया मुझको तैयार।  
PhD का सफर अब है शुरू,  
हर सवाल में छुपा है नया गुरु।

PhD का सफर है लंबा, कठिन,  
पर गणित कहता है — “हर पल रहो दृढ़-चित्त!”  
हर Iteration से सीखते जाओ,  
Solution के Pareto Points तक पहुँचते जाओ।  
Solution के Pareto Points तक पहुँचते जाओ।  
Solution के Pareto Points तक पहुँचते जाओ।



## जिम्मेदारी

-डॉ. जयेश एम. ढोडिया

जिम्मेदारी है जी रहा हूं। जहर भी पी रहा हूं।  
चुनौति है पर लड रहा हूँ। मंजिल पे बढ रहा हूँ।।  
कोई क्या लगाएगा मेरे ख्वाहिशों का अंदाजा ।  
हर वक्त जी भी रहा हूं। हर वक्त मर भी रहा हूं।।

जिम्मेदारी.....

आप है तो जी रहा हु। आपके लिए ही जी रहा हूं।  
हैसियत के हिसाब से रिश्ते भी जी रहा हूं।।  
कोई क्या लगाएगा मेरे बर्दाश्त करने का अंदाजा ।  
मर जाने जैसा वक्त गुजार के भी जी रहा हूं।।

जिम्मेदारी.....

पहचान खो रहा हूं। पहचानने वालेभी खो रहा हूं ।  
मुझको समझने वाले अच्छे इंसानभी खो रहा हूं ।।  
कोई क्या लगाएगा मेरी किस्मत का अंदाजा ।  
बचपन से घर संभाले मुस्कान खो रहा हूं।।

जिम्मेदारी.....

चुप होकर जी रहा हूं। सब्र से जी रहा हूं।  
कुछ खोके जी रहा हूं। तो कुछ पाके जी रहा हूं।।  
कोई क्या लगाएगा मेरी मंजिल का अंदाजा ।  
मरते हुए हौसले के साथ चल के भी जी रहा हूं।।

जिम्मेदारी.....

## समंदर हूँ लौट के आऊंगा

-डॉ. जयेश एम. ढोडिया

समंदर हूँ लौट के आऊंगा।  
पानी हूँ, सुनामी बनके समझाऊंगा।  
तैरती क्रिश्ती को डूबनेसे बचाऊंगा।  
कर्म से ही आया हूँ और कर्म से ही जाऊंगा।

समंदर हूँ लौट के आऊंगा।

मेरी गहराई में सबको समाऊंगा।  
किनारो से टकराके कभी नहीं डराऊंगा।  
अपनी लहरों से रास्ते खुद बनाऊंगा।  
बदलने आया हूँ बदलके ही जाऊंगा।

समंदर हूँ लौट के आऊंगा।

शिक्षा का भंडार हूँ सूखा नहीं कहलाऊंगा।  
सुरक्षा का कर्म भी निष्ठा से निभाऊंगा।  
उफान से बहती सरिता को भी समाऊंगा।  
इंसाफ करने आया हूँ माफ़ करके जाऊंगा।

समंदर हूँ लौट के आऊंगा।

कर्म की मशाल लेकर आँधियों से टकराऊंगा।  
सफलताका स्वाद सबको चखाऊंगा।  
खामोशी मेरी वक्त पर सबको समझाऊंगा।  
तूफान बनकर आया हूँ उफान बनकर जाऊंगा।

समंदर हूँ लौट के आऊंगा।

## कर्म

डॉ. जयेश एम ढोडिया

एक दिन तुम्हारे ही कर्म, तुमसे मिलने आएंगे।  
बहुत ज्यादा हसाएंगे या बहुत ज्यादा रुलाएंगे।  
कर्म से ही आये है और कर्म से ही जाएंगे।  
तुम घमंड करना ही मत क्योंकि तुम्हारे कर्म ही तुमको समझायेंगे।

एक दिन तुम्हारे ही कर्म....

भूतकाल के कर्म ही भविष्य बनाएंगे।  
अच्छे कर्म ही हमें अच्छे मार्ग दिखाएंगे।  
बुरा कर्म, बुरे लोग, बुरे से ही मिलवाएंगे।  
तूम बुरा सोचना ही मत क्योंकि तुम्हारे कर्म ही तुमको बनाएंगे।

एक दिन तुम्हारे ही कर्म....

चापलूसी और जलन ही तुम्हारा सिर मुंडवाएंगे।  
बुरी आदते बुरे सपने ही तुमे मरवाएँगे।  
अच्छे कर्म धर्म से करो वही तुमे बचाएंगे।  
तुम गलत करना ही मत क्योंकि तुम्हारे कर्म ही तुमको जिताएंगे।

एक दिन तुम्हारे ही कर्म....

खुद बढो दूसरोंको बढाओ वाले काम तुमे आगे बढाएँगे।  
नाकामीओ से घबराना मत वो सही रास्ता बताएँगे।  
दूर रहना उन लोगोसे जो तुम्हे इस्तेमाल करवाएंगे।  
तुम निडर रहना क्योंकि तुम्हारे कर्म ही तुमको बचाएंगे।

एक दिन तुम्हारे ही कर्म....



*A picture of the decorated entrance to the Department*



*A picture of landscape of the Department*



*A picture of the Ramanujan Bust in the Department*



*A picture during Teacher's Day Celebration*



*A group picture during National Mathematics Week 2024*



A group picture of the faculties of the department



A group picture of the Int. M.Sc. graduates (A.Y. 2024-25)



# Pramiti 2025 Committee

## Faculty



Dr. Jayesh M Dhodiya



Dr. Indira P. Tripathi



Dr. Raj Kamal Maurya



Dr. Saroj R. Yadav

## Students



Bhavik Dodda



Devesh Singh  
Chauhan



Diya M.



Ekata Jain



Panchal Vidhi  
Vimalkumar



Shrusti Gaurang  
Upadhyay

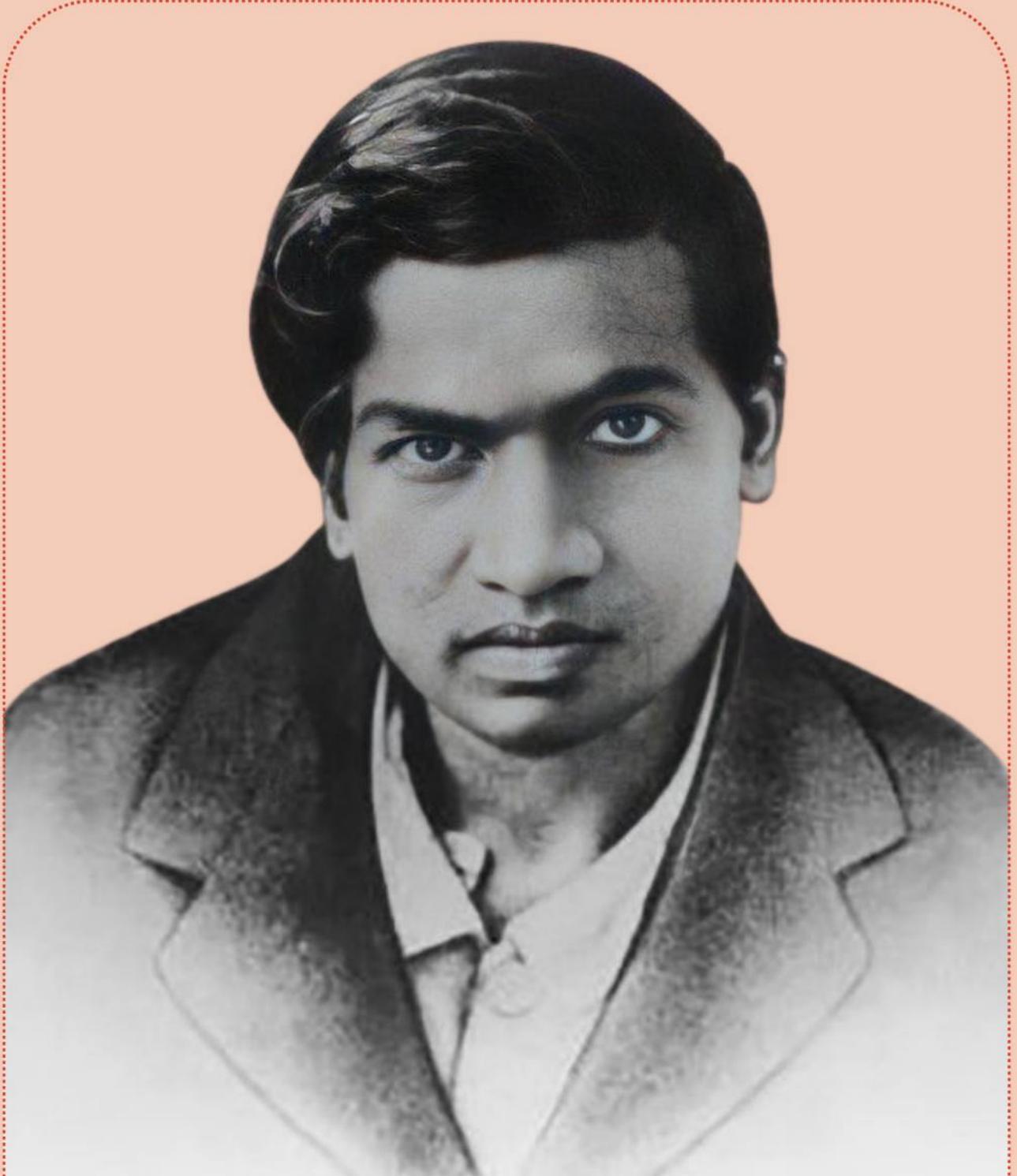


Theophilus Gera



Vaghasiya Jansi  
Sureshbhai

An equation has no meaning to me  
unless it expresses a thought of God  
-S. Ramanujan



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