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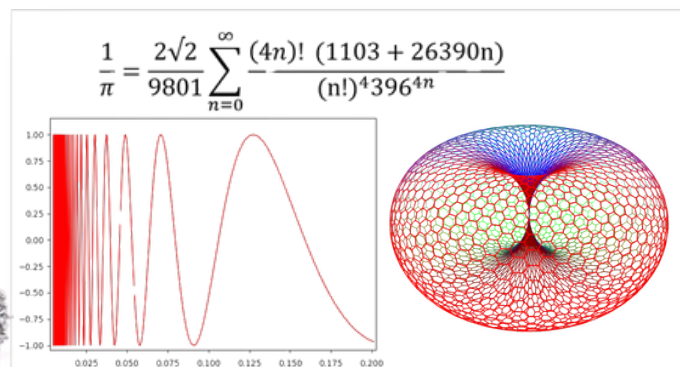
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GANANAM

A Quarterly Newsletter of
Department of Mathematics and Computing





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Message from the Head of Department



I am delighted to present Volume 3, Issue 1 of GANANAM, the quarterly newsletter of the Department of Mathematics & Computing, showcasing the ongoing progress, accomplishments, and academic excellence of the Department.

The Department is proud that three of its PhD students have been selected for the IndiaAI PhD Fellowship, awarded by the Ministry of Electronics and Information Technology (MeitY), Government of India, under the IndiaAI Mission. This achievement reflects the Department's sustained efforts to nurture skilled AI workforce.

During this period, the Department organized two outreach activities focusing on Statistical Modeling through Simulation in R and Mathematical Insights into Human Health, demonstrating its continued commitment to knowledge sharing and the development of human resources in the country.

In addition to the detailed information about abovementioned events and activities, this issue highlights recent research publications by our faculty colleagues, along with details of sponsored research projects and guest lectures delivered by them. It also features updates on recent developments and emerging trends in mathematics and computing.

Together, we are striving to significantly impact the world of mathematics, computing, and beyond. Looking ahead, we plan to expand our efforts, collaborate with diverse minds, and explore new frontiers of research and innovations.

I would like to express my heartfelt gratitude to the editorial team for their dedication in producing this newsletter, and I thank all contributors for their insightful and valuable contributions.

Prof. S. P. Tiwari, Head of the Department

Department Events

The Department organized a one-week interdisciplinary short-term programme on “Statistical Modeling through Simulation in R” under the Malaviya Mission Teacher Training Programme from 23rd to 28th February 2026, featured expert lectures by eminent academicians from leading institutions, covering diverse topics such as statistical inference, simulation-based modeling, Bayesian methods, machine learning using R, time series analysis, and interdisciplinary applications in ecology, epidemiology, and health research. The structured schedule included multiple daily technical sessions, fostering hands-on learning and research-oriented discussions.



The programme was organized by Prof. G. K. Vishwakarma. The inaugural function of the programme was graced by Prof. Somesh Kumar, Dean (Faculty), IIT Kharagpur, Prof. M. K. Singh, Dean (Academic), IIT (ISM) Dhanbad, and Prof. S.P. Tiwari, HoD (Mathematics & Computing), marking the commencement of the residential programme aimed at enhancing statistical modeling and computational skills.

Department Events

Two-Day Workshop on “From Equations to Life: Mathematical Insights into Human Health” was organized by the Department during March 27–28, 2026, with support from ANRF, to Prof. R.K. Upadhyay, PI under SSR activity and the NASI Jharkhand Chapter. The workshop aimed to raise awareness of human health among faculty, researchers, and students across Jharkhand while promoting emerging research areas. It focused on neurological disorders such as Alzheimer’s, Parkinson’s, and epilepsy, highlighting the role of mathematical approaches in understanding brain dynamics and improving prediction and treatment strategies.



The workshop attracted more than 65 participants, and distinguished speakers from different institutions included Prof. B. V. Rathish Kumar, Prof. Subhas Khajanchi, and Prof. Subhamoy Mondal. It commenced with an inaugural session graced by Prof. Sukumar Mishra (Director), Prof. S. P. Tiwari (Head of the Department), Prof. R. K. Upadhyay (Convenor), and Prof. Parimita Roy (Co-convenor). The program concluded with a valedictory session led by Prof. Parth Sarthi Das, Dean (R&D).

Research & Publications



- K. Ji, H. K. Mishra, M. Mosonyi, M. M. Wilde. Barycentric bounds on the error exponents of quantum hypothesis exclusion, IEEE Transactions on Information Theory, 2026. (Accepted)
- Y. Arora, S. Laxmi, S. K. Gupta. A robust twin support vector machine with huberized hinge loss function with an application in handwritten digit recognition, Pattern Analysis and Applications, 2026. DOI: <https://doi.org/10.1007/s10044-026-01611-4>.
- Shreya Shukla and S. A. Sahu. Dynamic tuning of shear horizontal waves in flexoelectric-composites with imperfect interfaces on semiconductor substrates. Published online in Composite Structures, 382(2026), 120061. January 2026. DOI: 10.1016/j.compstruct.2026.120061.
- D. Pradhan, V. Sharma, R. Skrekovski. A remark on a result on odd colorings of planar graphs, Discrete Mathematics, 349, 115014, 2026. DOI: 10.1016/j.disc.2026.115014.
- M. A. Henning, P. Maniya, D. Pradhan. Disjunctive domination in maximal outerplanar graphs, Discrete Applied Mathematics, 385, 24-61, 2026. DOI: 10.1016/j.dam.2025.12.056.
- C. Dey, M. Verma, S. Kumawat. Source free domain adaptation for retinal image segmentation using fourier style augmentation, 32nd National Conference on Communications (NCC), IIT Hyderabad, 2026.
- R. R. Kamat and H. K. Mishra. Simultaneous symplectic spectral decomposition of positive semidefinite matrices, Linear Algebra and its Applications, 737, 298-307, February 2026. DOI: 10.1016/j.laa.2026.02.023.
- S. Misra and N. Ray. On Stability of Syzygy bundles, Bulletin des Sciences Mathematiques, 208, 103783, 2026. DOI: 10.1016/j.bulsci.2025.103783.
- T. K. Das, T. Ojha, N. Choudhury, A. Kaushik. A hybrid FL-MARL framework for optimal trajectory control and resource allocation in integrated terrestrial and non-terrestrial networks. IEEE ICC Workshops, Glasgow, Scotland, May 2026. (Accepted)
- A. Gorrela, S. V. Gudipudi, N. Choudhury, A. Hazarika, T. Ojha, A. Jindal. Framework-aware resilient ADR for relay-connected LoRaWAN IoT networks. IEEE ICC Workshops, Glasgow, Scotland, May 2026. (Accepted)



Research & Publications

- **R. K. Upadhyay**, R.D. Parshad, N. M. Tripathi, N. Mohan. An Eco-epidemiological model with prey-taxis and slow diffusion: Global existence, boundedness and novel dynamics. *Journal of Mathematical Analysis and Applications*, 558, 1-44, 130387, 2026. DOI: 10.1016/j.jmaa.2025.130387.
- N. M. Tripathi, **R. K. Upadhyay**, D. Barman, A. Madzvamuse. Emergence of bursting and delay-induced spiral patterns in Eco-epidemiological systems. *Bulletin of Mathematical Biology*, 88, 63, 1-56, 2026. (Accepted)
- S. Roy, A. Sarkar, Sk. Nazmul, P. K. Tiwari, **R. K. Upadhyay**. Bifurcation analysis and fear-induced reactions in non-refuged prey with cooperative hunting among predators: Deterministic and stochastic dynamics. *Mathematical Biosciences*, 395, 109641, 1-22. DOI: 10.1016/j.mbs.2026.109641.

DOCTORAL HIGHLIGHTS

Thesis Defense



Bhrigu Kumar Rajbongshi (21DR0040) defended his PhD thesis on “Handling Missing Values in Longitudinal and Survival Data”, supervised by **Prof. G. K. Vishwakarma**. Congratulations Dr. Bhrigu!!

His research focuses on improving how we analyze medical data when some information is missing or incomplete. In real-life studies, patients may miss visits or drop out, and not all outcomes are fully observed which can make results unreliable. This work develops better methods to fill in missing information and adjust the analysis so that the results remain accurate. In particular, it combines Multiple Imputation (MI) and Inverse Probability Weighting (IPW) within frameworks such as Generalized Estimating Equations (GEE) and joint modeling. It also introduces techniques like propensity score matching and survival proximity scores to handle informative censoring. These methods are further extended to frailty and multistate survival models to capture hidden variations between patients. These approaches are tested on real medical datasets to ensure they work well in practice. The methods are implemented in R software, making them easy for researchers to use. Overall, the goal is to help doctors and researchers draw more accurate and reliable conclusions, even when the data is incomplete.



Sponsored Research Projects

- Robust Signal Reconstruction and Prediction in Aeronautical Systems Using Derivative Sampling Expansions, PI: **A. A. Selvan**, Co-PI: **Prof. A. Prasad**, Amount: INR 44.9811 Lakhs, Sponsor: DRDO.
- Prediction of relapse time and recovery rate of substance use disorder based on longitudinal survey study applying statistical and machine learning tools. PI: **Prof. S. Mondal**, Co-PIs: **Prof. S. Laxmi**, Prof. Dr. P. K. Roy (Department of Clinical Psychiatry-A Center of Excellence, Kolkata) Amount: INR 35 Lakhs, Sponsor: ANRF (ARG scheme).

ACHIEVEMENTS

Student Achievements

Three PhD Students from the department got selected for the **IndiaAI Research Fellowship** offered by the Ministry of Electronics and Information Technology (MeitY), Government of India, under the IndiaAI Mission. Congratulations to them!

Their thesis work is focused on various areas of artificial intelligence and machine learning, including computer vision, computing systems and traffic flow analysis.



Ms. Suman

25DRO220

Supervisor: Prof. S. Kumawat



Mr. Rakesh Pradhan

25DRO059

Supervisor: Prof. A. Kalita



Mr. Surjya Narayan Rath

25DRO225

Supervisor: Prof. S. Chatterjee



Invited Talks

- **Prof. H. K. Mishra** delivered an invited talk titled “On generalization of Williamson's theorem to real symmetric matrices”, at the Indo--European Conference 2026, SPPU and IISER Pune. [January 13, 2026]
 - **Prof. S. Misra** delivered an invited talk titled "Lazarsfeld-Ein type inequality for Seshadri constants of vector bundles" at Indo-European conference 2026 held at IISER Pune and SPPU University. [January 13, 2026].
 - **Prof. J Dasgupta** delivered an invited talk on “Equivariant sheaves on complexity-one T-varieties”, at the Discussion Meeting on Algebraic Geometry and Representation Theory, TIFR Mumbai, [19 January 2026]
 - **Prof. S. A. Sahu** delivered an invited talk on "Differential Equations: A Gateway to Real-World Modeling" as Resource Person on in International Faculty Development Program (FDP) “Quantifying Innovation: The Role of Mathematics & Statistics in Science & Technology” at Department of Mathematics, School of Science, O. P. Jindal University, Raigarh (India). [20 January 2026]
 - **Prof. T. Ojha** delivered a guest lecture on “Evolution of IoT and Edge Computing” at an FDP organized by SRM University-AP. [23 January 2026]
 - **Prof. T. Ojha** delivered an invited lecture on “AI/ML for the Next Evolution in Future IoT Networks” at 3rd Frontier Symposium in Data Science 2026 (FS-DSC 2026) at IISER Thiruvananthapuram. [31 January 2026]
 - **Prof. M. K. Singh** delivered an invited talk on the topic “NEP-2020: State Level Reforms & Implementation Strategies” in Shiksha Samvad-2026 organized by Department of Higher Education, Govt. of Chhattisgarh, Raipur. [17 February 2026]
-

Invited Talks

- **Prof. M. K. Singh** delivered an invited talk on the topic “Multispecies Advection-Dispersion Transport Modelling” in a National Conference on Recent Developments in Mathematics and Statistics organized by Department of Mathematics and Statistics, CUJ Jharkhand. [27 February 2026]
- **Prof. M. K. Singh** delivered an invited talk on the topic “AI Strategic Implementation and Computation for Viksit Bharat-2047” in 4th International Conference on Engineering Design and Computing at Swami Vivekananda University, Kolkata. [28 February 2026]





Mathematics & Computing News

- **Scientists finally see the atomic flaws hiding inside computer chips:** Researchers at Cornell University have developed a powerful imaging technique that reveals atomic scale defects inside computer chips for the first time. Using an advanced electron microscopy method, the team mapped the exact positions of atoms inside tiny transistor structures and uncovered small imperfections nicknamed “mouse bites.” These defects form during the complex manufacturing process and can disrupt how electrons flow through a chip’s channels, which are only about 15 to 18 atoms wide. [\[Read More\]](#)
 - **ChatGPT as a therapist? New study reveals serious ethical risks:** As millions turn to ChatGPT and other AI chatbots for therapy-style advice, new research from Brown University raises a serious red flag: even when instructed to act like trained therapists, these systems routinely break core ethical standards of mental health care. In side-by-side evaluations with peer counselors and licensed psychologists, researchers uncovered 15 distinct ethical risks — from mishandling crisis situations and reinforcing harmful beliefs to showing biased responses and offering “deceptive empathy” that mimics care without real understanding. [\[Read More\]](#)
 - **Learning to be uncertain before learning from data:** Modern machine learning systems are increasingly deployed in safety-critical domains, including autonomous driving, medical diagnosis, and decision-support applications. In such contexts, accuracy alone is insufficient. The confidence of a system should accurately reflect the likelihood of its predictions being correct. However, modern neural networks are notoriously overconfident, often assigning high probabilities to incorrect or even nonsensical outputs, including inputs far outside their training distribution. Such miscalibration has emerged as a central obstacle to trustworthy artificial intelligence, underlying failures ranging from medical misdiagnoses to hallucinations in large language models. [\[Read More\]](#)
-

Faculty Profiles



Prof. A Antony Selvan

ASST. PROFESSOR

Computational Harmonic Analysis



Prof. Abhay Kumar Singh

ASSOC. PROFESSOR

Coding Theory, Post Quantum
Cryptography, Quantum Computing



Prof. Abhishek Kumar Singh

PROFESSOR

Differential Equations, Integral Equations,
Solid Mechanics, Elastodynamics, Wave
Propagation and Vibration Aspects,
Theoretical Seismology



Prof. Ajit Singh

ASST. PROFESSOR

Number Theory and Combinatorics,
Partition Theory, q-series and Modular
Forms



Prof. Akhilesh Prasad

PROFESSOR

Integral Transforms, Pseudo-Differential
Operators, and Wavelet Analysis



Prof. Alakesh Kalita

ASST. PROFESSOR

Internet of Things (IoT), AI/ML For
Computer Systems, Edge/Cloud
Computing



Prof. Anurag Jayswal

PROFESSOR

Mathematical Programming, Generalized
Convexity, Vector Optimization, Variational
Inequality, Optimal Control



Prof. Ashok Das

ASST. PROFESSOR

Modeling, simulation, and analysis of
particulate processes



Prof. Atul Kumar Verma

ASST. PROFESSOR

Mathematical Modelling & Simulation,
Statistical Mechanics



Prof. Badam Singh Kushvah

PROFESSOR

Astrodynamics, Guidance and Control
Systems, Space Trajectory Design, GPU
Computing/HPC



Prof. Dinabandhu Pradhan

ASSOC. PROFESSOR

Graph Theory And Graph Algorithms



Prof. Gajendra K. Vishwakarma

ASSOC. PROFESSOR

Survey Sampling Theory and Techniques,
Regression Models and Machine Learning, Data
Imputation Models, Bayesian Statistics, Joint
Modeling and Longitudinal Data Analysis



Prof. Garib Nath Singh

PROFESSOR (HAG)

Sample Surveys, Missing Data Analysis,
Data Analysis



Prof. Hemant Kumar Mishra

ASST. PROFESSOR

Matrix Analysis, Quantum Information
Theory, Linear Algebra, Functional Analysis



Prof. Jyoti Dasgupta

ASST. PROFESSOR

Algebraic Geometry



Prof. Kartikay Gupta

ASST. PROFESSOR

Data Science And Machine Learning

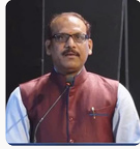
Faculty Profiles



Prof. Manisha Verma

ASST. PROFESSOR

Computer Vision, Deep Learning, AI in Healthcare



Prof. Mritunjay Kumar Singh

PROFESSOR (HAG)

Solute Transport Modelling, Groundwater Contamination Problems, Mathematical Modelling & Computation



Prof. Neeru Bala

ASST. PROFESSOR

Operator theory



Prof. Pramod Kumar Kewat

ASSOC. PROFESSOR

Algebraic Coding Theory and Number Theory



Prof. Ramanababu Kaligatla

ASSOC. PROFESSOR

Differential And Integral Equations, Wave-Structure Interactions



Prof. Ranjit Kumar Upadhyay

PROFESSOR (HAG)

Nonlinear Differential Equations, Chaos Modeling, Mathematical Neuroscience, Nonlinear dynamics, Disease dynamics, Population dynamics, Virus dynamics, Brain dynamics and Neural modeling



Prof. S. P. Tiwari

PROFESSOR

Topology, Category Theory, and Fuzzy Automata Theory



Prof. Sanjeev Anand Sahu

ASSOC. PROFESSOR

Electro-elastodynamics & Magneto-elastodynamics, Solid Mechanics, Early Earthquake Warning System



Prof. Santimoy Kundu

ASSOC. PROFESSOR

Theoretical Seismology And Wave Propagation Aspects



Prof. Scindhiya Laxmi

ASST. PROFESSOR

Physics Informed Machine Learning, Support Vector Machines, Scientific Artificial Intelligence



Prof. Shuvashree Mondal

ASST. PROFESSOR

Statistical inference, Robust estimation, Reliability Analysis, Distribution Theory



Prof. Snehajit Misra

ASST. PROFESSOR

Vector bundle theory, algebraic geometry, Seshadri constants, moduli problems of vector bundles and Higgs bundles on projective varieties



Prof. Srinivasa Rao Pentyala

ASSOC. PROFESSOR

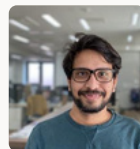
Numerical Methods for PDEs, CFD, AI/ML Procedures for Solution of Real Life Models



Prof. Subhashis Chatterjee

PROFESSOR

Software Engineering, Algorithms, Bioinformatics



Prof. Sudhakar Kumawat

ASST. PROFESSOR

Computer Vision, Deep Learning



Prof. Tamoghna Ojha

ASST. PROFESSOR

AI/ML For IoT, Edge Computing, Digital Twin, 5G/6G, Future Networks

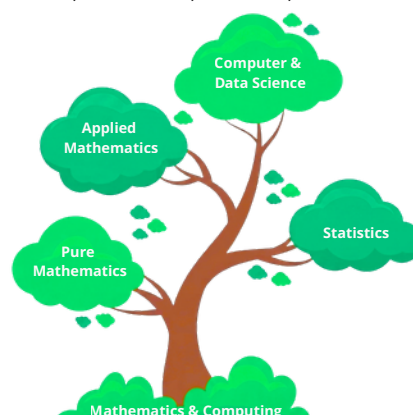


About the Department

The Department of Mathematics and Computing at IIT(ISM) Dhanbad has its roots in the establishment and evolution of the institute itself. Over the decades, the institution has expanded its academic offerings, and our Department is one of the key departments that emerged as part of the institute's broader academic growth.

Presently, the department is home to 32 faculty members, engaged in a wide array of research fields including Applied Mathematics, Pure Mathematics, Statistics, and Computer & Data Science. Our research efforts are supported and recognized by prominent national funding agencies such as CSIR, NBHM, DRDO, ISRO, and DST.

The department offers the programs such as B. Tech (Mathematics & Computing), Integrated M.Tech (Mathematics & Computing), M. Sc (Mathematics & Computing) and M. Tech (Data Analytics). In addition, the department also offers a Ph.D. program in Mathematics and Statistics. Currently, over 100 Ph.D. students are engaged in research at the department.



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