



**INDIAN INSTITUTE
OF TECHNOLOGY**
(INDIAN SCHOOL OF MINES)
DHANBAD

Legacy that inspires the future

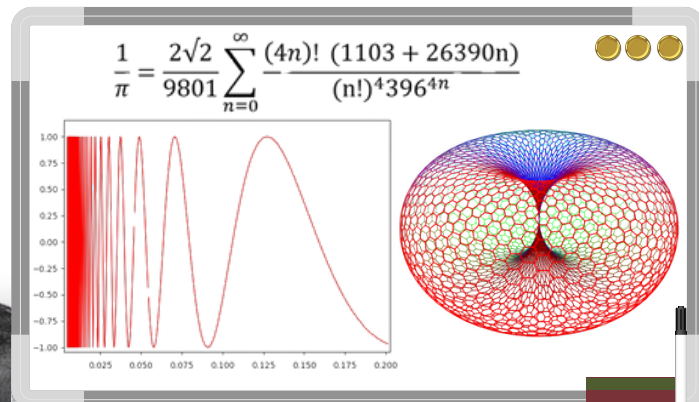
SEPTEMBER 2025

VOL. 2 | ISSUE 9



GANANAM

*A Monthly Newsletter of
Department of Mathematics and Computing*



EVENTS

National Conference on Mathematical Analysis and Applications (NCMAA) was organized during September 4-6, 2025 by **Prof. A. Prasad** (Convener) and **Prof. A. Selvan** (Co-convener and Organizing Secretary).

NCMAA brought together researchers, scholars, and scientists to share ideas and recent developments in Mathematical Analysis and its applications. The event featured expert lectures, promoting interdisciplinary dialogue and collaboration, especially among young researchers. Participants explored the role of mathematics in addressing real-world challenges across science, technology, and industry. The conference fostered innovation, knowledge exchange, and future research directions in both pure and applied mathematics. It aimed to strengthen the mathematical community and encourage impactful, collaborative research.



The conference was graced by Prof. Tirthankar Bhattacharyya (FASc, FNA, FNASc, J. C. Bose Fellow) from Department of Mathematics, IISc Bangalore as the Chief Guest and Prof. R. Radha (IIT Madras) among others. NCMAA covered research in the following areas: Integral Transforms, Fourier Analysis, Sobolev Spaces, Approximation Theory, Frame Theory, Pseudo-Differential Operators, Signal and Image Processing, Wavelet Analysis, Heisenberg Group, Distributions, Elliptic Equations.

EVENTS

GIAN course on "Introduction to Hydrodynamic Stability" was organized during September 15-19, 2025 by **Prof. S. Kundu**.

The course was graced by Prof. Sergey A. Suslov, Swinburne University of Technology, Australia, an internationally acclaimed expert in theoretical fluid mechanics and nonlinear wave phenomena, who delivered expert lectures throughout the program.



Short Term Course on Machine Learning with Excel was organized by **Prof. S. Chatterjee** and **Prof. A. K. Singh** during September 1-6, 2025.

This course aimed to introduce participants to the fundamental concepts and applications of Machine Learning (ML), a core area of Artificial Intelligence that enables systems to learn from data for tasks such as prediction, classification, and dimensionality reduction. Unlike conventional approaches that require programming knowledge in Python or R, this course adopted a user-friendly, no-code methodology using Microsoft Excel, making it accessible to participants from varied academic and professional backgrounds. The program included a balanced mix of theoretical sessions and practical hands-on exercises, guiding participants through the process of developing, training, validating, and applying ML models. The hands-on sessions helped the participant to gain experience on how to develop, train and validate a ML model as well as how to use this model for practical application. No prior programming experience was required, making this an ideal opportunity for anyone interested in learning ML in an intuitive and practical manner.

PUBLICATIONS

- **R. B. Kaligatla**, P. Panja, B. N. Mandal. Wave Interaction with an H-shaped submerged breakwater, *The ANZIAM Journal*, 67:e32, 1-22, doi:10.1017/S144618112510014X.
- S. Chowdhury and **P. S. Rao**. Numerical analysis of MHD radioactive bioconvective hybrid nanofluid in a Darcy-Brinkman-Forchheimer porous medium over a stretching surface, *Pramana - Journal of Physics* (2025) 99-125, <https://doi.org/10.1007/s12043-025-02987-4>.
- C. Amala, B. Subbarao, M. Sivaji, **T. Ojha**, B. B. Das, S. P. Mohanty, S. K. Ram. Everything You Wanted to Know about Secure Energy Harvesting Techniques for IoT Devices-A Review, *IEEE Sensors Journal*, 2025 [DOI: 10.1109/JSEN.2025.3614640].
- R. Ghosh, **A. A. Selvan**. Beurling-Landau density theorems for interpolation of bandlimited functions in the fractional Fourier domain, *Results in Mathematics*, 80:201, 2025.
- S. Kumari, **S. A. Sahu**, and M. Biswas. SH wave analysis in nanoscale piezoelectric composite loaded with viscous liquid, *Mechanics Based Design of Structures and Machines*, 1-20, 2025. DOI: 10.1080/15397734.2025.2562326.
- **R. B. Kaligatla**, P. Panja, B.N. Mandal. Wave interaction with a rectangular breakwater with two unequal legs in oblique sea, in *XII International Scientific Conference on Modern Problems of Mathematics and Mechanics*, 03-06 Sep 2025, conducted by Institute of Mathematics and Mechanics, Baku, Azerbaijan.
- M. Vaiyata, **T. Ojha**, N. Choudhury, J. Dave, P. Lorenz. Distributed RL-Based UAV Selection for Reliable Task Execution in Aerial IoT Edge Networks, in *IEEE GLOBECOM Workshops*, December 2025.
- R. Rahman, N. Choudhury, W. Xiang and **T. Ojha**. FlexiFrame: Adaptive Slotframe Scheduling for 6TiSCH-Based Smart City IoT Networks, in *IEEE GLOBECOM Workshops*, December 2025.

PHD AWARDED



Tapan Chatterjee (17DR000562) awarded a PhD degree dated 15/09/2025 entitled "Mathematical Modeling Of Transport Phenomenon In Porous Medium" under supervision of **Prof. M. K. Singh**.

The work investigates fundamental issues regarding groundwater contamination problems through numerical and analytical techniques and further validates the outcome against the data available in the literature. One can see that how contaminants pass through porous media at the initial stage to analyze their fate. The origin of the contaminated area has to determine due to the transport processes of contaminants within a heterogeneous porous medium. A new inverse modeling approach determines both the source location and strength using Weierstrass's polynomial approximation theorem. The study of the inverse problem through the data shows that several key parameters significantly influence water quality and dealt with machine learning algorithms to discover which parameter significantly impacts a specific dataset. Removal of contaminants from surface water and groundwater dealt with a different SIR model. The transportation model is also applied to study water uptake through the roots.

INVITED TALKS

- **Prof. T. Ojha** delivered an invited talk on "Federated Learning Platforms Addressing Security and Privacy" at FDP on "Federated Learning for User Privacy and Data Confidentiality" Organized by NIT Delhi with the association of EICT, IIT Roorkee. [3 September]
- **Prof. P. S. Rao** delivered an invited talk on "Neural Network based Numerical Simulations" (Online FDP Program on Scientific Computing), organized by Stanley College of Engineering & Technology for Women (JNTU Affiliated, Hyderabad) [6 September 2025]
- **Prof. T. Ojha** delivered an invited talk in ACM Research Opportunities in Computer Science (ROCS) on "The Next Evolution in Future IoT Networks" at Chitkara University, Punjab. [19 September]
- **Prof. H. Mishra** delivered a talk based on his paper "Near-optimal performance of square-root measurement for general score functions and quantum ensembles" at the conference QMATH16 (mathematical results in quantum information theory) held at the Technical University of Munich (TUM) in Germany during Sep 1-5.

SPONSORED PROJECTS

- “Revolutionizing Autonomous Navigation through Occlusion-Resilient Autonomous Driving Using Intelligent Perception Systems”, Grant on Collaborative Research Support Scheme from IIT (ISM), PI: Prof. S. Halder, Co-PI: **Prof. T. Ojha**, Prof. S. Mandal, 60 Lakhs, 2 years.
- “Analytic and Combinatorial Web of Modularity”, INSPIRE Faculty Research Grand (DST INSPIRE), PI: **Prof. A. Singh**, 35 Lakhs, 5 Years.

STUDENT ACHIEVEMENT

- Dr. Shanya Baghel (defended her thesis on 10th July, 2025) joined the Department of Industrial Engineering, Hanyang University, South Korea as a post-doc fellow.

MATHEMATICS AND COMPUTING NEWS

- **Scientists unveil breakthrough pixel that could put holograms on your smartphone:** A team at the University of St Andrews has unlocked a major step toward true holographic displays by combining OLEDs with holographic metasurfaces. Unlike traditional laser-based holograms, this compact and affordable method could transform smart devices, and even virtual reality. [[Read More](#)]
- **Cosmic simulations that once needed supercomputers now run on a laptop:** Astronomers have long relied on supercomputers to simulate the immense structure of the Universe, but a new tool called Effort.jl is changing that. By mimicking the behavior of complex cosmological models, this emulator delivers results with the same accuracy in just minutes on a standard laptop. [[Read More](#)]

EDITORIAL TEAM

Prof. S P Tiwari (HOD), Prof. Atul Kumar Verma, Prof. Tamoghna Ojha, Tarun Kr Das.
Contact : gananam@iitism.ac.in