



## About the department @ BPHC

The department of Mathematics was established in 2008, along with the establishment of BITS-Pilani, Hyderabad Campus.

Presently, the department offers Integrated M.Sc., Ph.D. in Mathematics, and Minor in Data Science with the Computer Science Department. We also offer various courses and programs to industry professionals through Work Integrated Learning Programs.

The department has 28 faculty members, out of which 3 are Professor, 10 are Associate Professor and 15 are Assistant Professor. Our faculty members are actively engaged in conducting research in multi-dimensional areas of Mathematics such as Algebra, Analysis, Applied Statistics, Computational Fluid-dynamics, Cosmology & Relativity, Cryptography, Differential & Integral Equations, Graph Theory, Mathematical Modelling, Number theory, and Quantum information theory.

Since its establishment, the department has produced/awarded 16 Ph.D. who are now working in re-

puted institutions or pursuing Post-doctoral research abroad.

Currently, the department of Mathematics has 69 Ph.D. students.

CSIR	9
Inspire	6
UGC	17
Projects	6
Institute	26
Aspirant	1
Part-time	4



The department has a well-furnished computational lab with 20 computers equipped with MATLAB, Mathematica and Statgraphics. It has one main node and two computational nodes. It also includes a library. This is supported by the FIST grant received by DST, Govt. of India.





## AWARDS AND ACHIEVEMENTS

# Aganit

**Vinodkumar Ghale** won the Best Poster Presentation award in Vidwanotsav-2023, at BITS Pilani Hyderabad Campus



Vinodkumar Ghale presenting his poster at Vidwanotsav-2023

**Kshma Trivedi & Vipin V** received CSIR Foreign Travel Grant to attend ICIAM-2023

**Kailash Swami, Santanu K Dash, Kshma Trivedi, Vipin V & Amya Ranjan Ray** were given

ICIAM FS1 Grant to attend ICIAM 2023

**Prof. Manish Kumar** received ICIAM FS1 Grant to attend ICIAM 2023

&

NBHM International Travel Grant to attend and present paper in ICIAM 2023, Tokyo, Japan

**Prof. Santanu Koley** was granted SERB ITS Grant and ICIAM FS1 Grant to attend ICIAM 2023

&

Received a Project on Teaching and Pedagogy, TLC BITS Pilani Hyderabad Campus

**Prof. P.K. Sahoo** was awarded Transilvania Fellowship for visiting professors during 24 May to 22 July, 2023



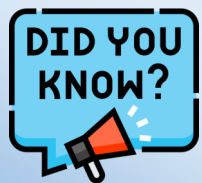
**MS. MARLENE FUNCK**

Ms. Marlene Funck has joined as an Intern under DAAD RISE

a Bachelor of Physics student from Hannover - Gottfried Wilhelm Leibniz Universität Hannover, Arndtstraße

worldwide program at BITS-Pilani Hyderabad Campus.

She will work under the supervision of Prof. P.K. Sahoo, Dept. of Mathematics during Aug 12-Sep 24, 2023.



If you shuffle a deck of cards properly, it's more than likely that the exact order of the cards you get has never been seen before in the whole history of the universe.





## ACADEMIC VISITS

**Prof. Sharan Gopal** visited

Auburn University, Auburn, USA during 10<sup>th</sup>-22<sup>th</sup> July, 2023 for a collaborative work

**Prof. Santanu Koley** visited

Jadavpur University, India during 22<sup>nd</sup> May - 20<sup>th</sup> July, 2023 for SERB CRG project collaborative work

**Hirendra Kumar Garai and Mintu Mandal** visited

TCG-Crest/ISI Kolkata during 13<sup>th</sup> - 31<sup>st</sup> July, 2023 for collaborative work

**Vinodkumar Ghale** visited

Indian Institute of Technology Guwahati, India during 20<sup>th</sup> - 31<sup>st</sup> August, 2023 for collaborative work

**Prof. P.K. Sahoo** visited Transilvania University of Brasov during 24<sup>th</sup> May - 22<sup>nd</sup> July, 2023.



## KNOW A MATHEMATICIAN



### Claude E. Shannon

Claude Shannon, often regarded as the "father of information theory," was a pioneering mathematician and engineer whose work laid the foundation for modern digital communication and cryptography. His groundbreaking ideas revolutionized the way we understand and transmit information.

To know more about him, the documentary "[The Bit Player](#)" is an excellent resource.

**We know the past but cannot control it. We control the future but cannot know it.**

— Claude E. Shannon





**XXIII International Conference "Physical Interpretations of the Relativity Theory PIRT-2023" during 3<sup>rd</sup> - 6<sup>th</sup> July, 2023 at Bauman Moscow State Technical University, Russia**

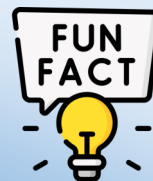
Bauman Moscow State Technical University

## Presentations:

- Wormhole: Is it Science or Science fiction?  
By: **Prof. P.K. Sahoo**
- Constraining teleparallel gravity with the dynamical system analysis and the cosmological implications.  
By: **Prof. B.Mishra**
- Non-singular Bouncing Solution of the Universe in Extended Symmetric Teleparallel Gravity.  
By: **Agrawal Amarkumar Shyamsunder**
- Teleparallel scalar-tensor gravity through cosmological dynamical systems .  
By: **Kadam Siddheshwar Atmaram**
- Analysing the geometrical and dynamical parameters of the modified Teleparallel–Gauss–Bonnet model  
By: **Santosh V Lohakare**
- Dynamical system analysis in  $f(T,\phi)$  gravity.  
By: **Lokesh Kumar Duchaniya**
- Phantom cosmological model with observational constraints in  $f(Q)$  gravity.  
By: **Shubham Atmaram Narawade**



Prof. B. Mishra at PIRT-2023



A sheet of paper cannot be folded into half more than 7 times!





## PRESENTATIONS AND TALKS

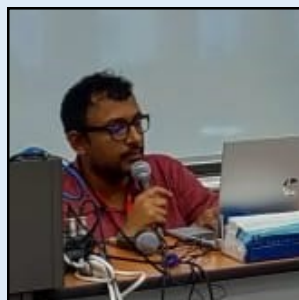


10th International Congress on Industrial and Applied Mathematics. during 20<sup>th</sup> - 25<sup>th</sup> August, 2023 at Waseda University, Tokyo, Japan

### Presentations:

- Robust bring your own encryption algorithm using generalized heat equation associated with generalized Vigenère-type table over symmetric group.  
By: **Prof. Manish Kumar**
- Integral Equations Techniques for Floating Flexible Membrane .  
By: **Prof. Santanu Koley**
- A Priori error estimates for parabolic Interface Problems with measure data .  
By: **Dr. Jhuma Sen Gupta**
- Water Wave Trapping by Porous Barriers Using Boundary Element Method.  
By: **Kailash Swami**
- Water wave interaction with porous wave barriers placed over stepped seabed .  
By: **Santanu Kumar Dash**
- Optimization of a submerged piezoelectric wave energy converter device using ANN Model.  
By: **Vipin V**
- Mathematical modelling of hybrid wave energy converter device.  
By: **Kshma Trivedi**
- RANS modelling of OWC device over the sloping seabed.  
By: **Amya Ranjan Ray**

**Shivangi Joshi** presented a paper on “A non-conforming least-squares spectral element method for Stokes interface problems” at **International Conference on Spectral and Higher Order Methods** during 14<sup>th</sup> - 18<sup>th</sup> August, 2023 Yonsei University, Seoul, South Korea.



*In clockwise order starting from top left corner:*  
Shivangi Joshi at Yonsei University, Seoul; Prof Manish Kumar , Prof. Santanu Koley, Dr. Jhuma Sen Gupta, Vipin V, and Kshma Trivedi at Waseda University, Tokyo



Fourth International Conference on Advances in Physical Sciences and Materials 2023 during 17<sup>th</sup> - 18<sup>th</sup> August, 2023 at KPR Institute of Engineering and Technology, Coimbatore, India.

KPR Institute of Engineering and Technology

**Presentations:**

- Homotopy Analysis Method and how the choice of Base Functions affect the convergence of Homotopy Series Solution.

By: **Subhendu Paul**

- Performance of an OWC Device Under the Influence of Ocean Currents.

By: **Santanu Kumar Dash**

- Wave Interaction with Bottom Standing Breakwater in the Presence of Current.

By: **Kailash Swami**

**Sunita Kumawat** presented a paper on “Transference of CSH waves in a cylindrical structure composed of piezo-reinforced materials” in **Cukurova 11th International Scientific Researches Conference** during 22<sup>nd</sup> - 24<sup>th</sup> August 2023 at Institute of Economic Development and Social Sciences, Adana, Turkey.



**Aleena Philip** at Pondicherry University

The 29th International conference on Finite and Infinite Dimensional Complex Analysis and its Applications

during August 21<sup>st</sup> - 25<sup>th</sup> 2023 at Department of Mathematics, Pondicherry University

**Presentations:**

- Characterizations of approximation properties in weighted spaces of holomorphic functions.
- Traced tensor norms and mid  $p$ -summing operators.

By: **Dr. Deepika**

By: **Aleena Philip**





SSIHL, AP

National Conference on Recent Trends in Mathematical Biology Theory, Methods & Applications during 20<sup>th</sup> - 22<sup>nd</sup> July 2023 at Prasanthi Nilayam Campus, Sri Sathya Sai Institute of Higher Learning, Andhra Pradesh

Debismita Nayak presented a paper “On Building Machine Learning Models for Medical Data Set with Correlated Features”.

**Kadam Siddheshwar Atmaram** presented a paper on “Noether Symmetries in Extended Teleparallel Gauss-Bonnet Cosmology” in the conference **Cosmology from Home 2023** during 3<sup>rd</sup> - 14<sup>th</sup> July 2023 (Online).

## Ph.D. AWARDED



Scholar: **Mr. FAIZ IMAM**

Ph.D. thesis: **“Study of Dynamics of Automorphisms on Solenoids and other Compact Groups”**

Supervisor: **Prof. Sharan Gopal**

Final Viva-voce: **11<sup>th</sup> August, 2023**





## WORKSHOPS

# Aganit

Advanced Instructional School on Algorithmic Graph Theory (2023), ATM School Workshop  
during 15<sup>th</sup> June - 26<sup>th</sup> July 2023 at IIT Indore



Akankshya Sahu with other participants

National Instructional Workshop on Cryptology: Code-based Cryptography (2023)

during 5<sup>th</sup> - 7<sup>th</sup> July 2023 at IIT BHU



Hirendra Kumar Garai



Nitin Kumar Sharma





## WORKSHOPS

Advanced Instructional School on Advanced Topics in Finite Fields (2023), ATM School Workshop during 10<sup>th</sup> - 29<sup>th</sup> July 2023 at IMSc, Chennai



Amritanshu Rai with other participants

A Short Course on Linear and Non-Linear Finite Element Analysis with Programming during 3<sup>rd</sup> - 7<sup>th</sup> July 2023 at BITS Pilani, Hyderabad Campus

Participants:

Anjali P.V., Shivangi Joshi & Amit Kumar Pal



Anjali P. V.

Workshop on Finite Element Method, Theory and Computation during 17<sup>th</sup> - 22<sup>nd</sup> July 2023 at IIIT Delhi

Participants:

N. Shravani, Shivangi Joshi & Sandhya Mel



Shivangi Joshi



- ◆ Brochero Martínez, F.E., **Rohit Gupta**, and Luciane Quoos. “[Classification of Some Permutation Quadrinomials from Self-Reciprocal Polynomials over  \$F\_{2^n}\$](#) .” *Finite Fields and Their Applications*.\*
- ◆ **Sabyasachi Dey**, **Hirendra Kumar Garai**, **Santanu Sarkar**, and **Nitin Kumar Sharma**. “[Enhanced Differential-Linear Attacks on Reduced Round ChaCha](#).” *IEEE Transactions on Information Theory*.\*
- ◆ **Sangeeta Dhawan**, and **Jagan Mohan Jonnalagadda**. “[Nontrivial Solutions for Arbitrary Order Discrete Relaxation Equations with Periodic Boundary Conditions](#).” *The Journal of Analysis*.
- ◆ **L. K. Duchaniya**, **B. Mishra**, and Jackson Levi Said. “[Noether Symmetry Approach in Scalar-Torsion  \$f\(T, \phi\)\$  Gravity](#).” *The European Physical Journal C*.\*
- ◆ **Moreshwar Tayde**, **Zinnat Hassan**, and **P.K. Sahoo**. “[Existence of Wormhole Solutions in  \$f\(Q, T\)\$  Gravity under Non-Commutative Geometries](#).” *Physics of the Dark Universe*.\*
- ◆ **Gaurav N. Gadbail**, **Ameya Kolhatkar**, **Sanjay Mandal**, and **P. K. Sahoo**. “[Correction to Lagrangian for Bouncing Cosmologies in  \$f\(Q\)\$  Gravity](#).” *The European Physical Journal C*.\*
- ◆ **Zinnat Hassan**, **Sayantana Ghosh**, **P. K. Sahoo**, and **V. Sree Hari Rao**. “[GUP Corrected Casimir Wormholes in  \$f\(Q\)\$  Gravity](#).” *General Relativity and Gravitation*.\*
- ◆ **Nijjwal Karak**, and **Debarati Mondal**. “[Besov and Triebel-Lizorkin Capacity in Metric Spaces](#).” *Mathematica Slovaca*.
- ◆ **Uma Vinod Kumar**, **Sunanda Saha**, and **Santanu Koley**. “[A Comparative Study of Wave Scattering by Non-Porous and Porous Flexible Plates in the Presence of a Submerged Porous Structure](#).” *Meccania*.\*
- ◆ **Genly Leon**, **Saikat Chakraborty**, **Sayantana Ghosh**, **Raja Solanki**, **P.K. Sahoo**, and **Esteban González**. “[Scalar Field Evolution at Background and Perturbation Levels for a Broad Class of Potentials](#).” *Fortschritte Der Physik*.\*
- ◆ **Raja Solanki**, **Zinnat Hassan**, and **P.K. Sahoo**. “[Wormhole Solutions in  \$f\(R, L\_m\)\$  Gravity](#).” *Chinese Journal of Physics*.
- ◆ **S.A. Narawade**, **Shashank P. Singh**, and **B. Mishra**. “[Accelerating Cosmological Models in  \$f\(Q\)\$  Gravity and the Phase Space Analysis](#).” *Physics of the Dark Universe*.\*
- ◆ **Manish Kumar** and **Divye Karla**. “[Efficient and lightweight data encryption scheme for embedded systems using 3D-LFS chaotic map and NFSR](#).” *e-Prime - Advances in Electrical Engineering, Electronics and Energy*.
- ◆ **Kshma Trivedi**, and **Santanu Koley**. “[Mathematical Modeling of Oscillating Water Column Wave Energy Converter Devices Placed over an Undulated Seabed in a Two-Layer Fluid System](#).” *Renewable Energy*.\*
- ◆ **Kshma Trivedi**, **Amya Ranjan Ray**, **Parothidil Anjusree Krishnan**, **Santanu Koley**, and **Trilochan Sahoo**. “[Hydrodynamics of LIMPET Type OWC Device under Stokes Second-Order Waves](#).” *Ocean Engineering*.\*
- ◆ **Santanu Kumar Dash**, **Kailash Chand Swami**, **Kshma Trivedi**, and **Santanu Koley**. “[Boundary Element Method for Water Wave Interaction with Semicircular Porous Wave Barriers Placed over Stepped Seabed](#).” *Advances in Intelligent Systems and Computing book series*.
- ◆ **Sunita Kumawat**, **Sumit Kumar Vishwakarma**. “[Circumferential SH wave in piezo-reinforced composite structure with imperfect interface bonding](#)” *Applied Mathematical Modelling*.\*

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## Book Chapters

### [Miniaturized Electrochemical Devices: Advanced Concepts, Fabrication, and Applications](#) (1st ed.).

CRC Press.

**Chapter 3:** *Mathematical Modelling of a Piezoelectric Wave Energy Converter Device Integrated with a Vertical Breakwater over a Stepped Seabed*  
By **Vipin Valappil**, **Santanu Koley**

**Chapter 14:** *Hydrodynamic Performance of a Submerged Piezoelectric Wave Energy Converter Device in Real Sea Conditions*  
By **Kshma Trivedi**, **Santanu Koley**

\* indicates Q1 journal





## OUR ALUMNI

# Aganit



**Dr. Narsimhulu Dunna**  
Assistant Professor,  
Department of Statistics and Applied Mathematics,  
Central University of Tamil Nadu

His research focus centers on applied mathematics, particularly in the domain of nonlinear partial differential equations (PDEs) pertinent to computational fluid dynamics (CFD) applications.

He holds a strong interest in crafting approximate analytical solutions, involving ODEs and PDEs. He actively explores diverse numerical techniques and simulations to gain insights into complex model systems across science and engineering, spanning fields like astrophysics, aerodynamics, nuclear science, geophysics, plasma physics, and underground nuclear explosions.

PhD Thesis: Self-Similar Solutions to Compressible flow Problems

Supervisors: Prof. A. Ramu / Prof. Dipak Satpathi

Year of completion: 2018



**Dr. Parbati Sahoo**  
Assistant Professor,  
Department of Mathematics,  
VIT-AP University

Her research expertise revolves around Relativity, Cosmology, Astrophysics, and Modified Gravity theories. Post-Ph.D., she gained valuable teaching experience as an ad hoc faculty member at NIT Calicut for one year. Following that, she embarked on a Postdoctoral position at the University of KwaZulu-Natal, Durban, South Africa. Presently, she holds the position of an assistant professor at VIT AP University and is soon to assume the role of an Assistant Professor at Bhadrak (Auto) College, OPSC, Govt. of Odisha

PhD Thesis: Study of accelerated expansion of universe in the framework of  $f(R,T)$  gravity

Supervisors: Prof. P.K. Sahoo / Prof. B. Mishra

Year of completion: 2019

## Editors

Chief Editor: Prof P.K. Sahoo  
Editor: Prof Sumit Kumar Vishwakarma  
Editorial Team: Nitin Kumar Sharma,  
Ashwini S,  
Anshid Aboobacker,  
Ruddaraju Amrutha ,  
Hirendra Kumar Garai

Contact us: [maths.bphc.newsletter@gmail.com](mailto:maths.bphc.newsletter@gmail.com)



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