

Seminar Report



Organized by

Panchmura Mahavidyalaya

Panchmura, Bankura, West Bengal

Academic Session: 2022-2023

“Recent Development of Differential Equations and Applications”

Theme: Recent development of differential equations and applications

Date: June 16, 2023

Venue: Seminar Hall (Panchmura Mahavidyalaya)

Organizer: Department of Mathematics

Objectives:

- To introduce the mathematical theory of linear and nonlinear, ordinary (ODE) and partial differential equations (PDEs).
- To describe application of ODE and PDEs in real-time data analysis
- To introduce the concepts, methods, applications, and logical arguments

Resource Persons:

- **Dr. Prashanta Chatterjee**, Professor and Ex-Head of the Department of Mathematics, Visva-Bharati
- **Dr. Bappa Das**, Associate Professor and Head of the Department of Mathematics, Bankura University
- **Dr. Uday Narayan Ghosh**, Assistant Professor and Head of the Department of Mathematics, Munger University

Inauguration & Welcome Address:

The seminar was organized in association with IQAC, Panchmura Mahavidyalaya. The seminar started with the introductory remarks by **Mr. Tanmay Roy**, State Aided College Teacher, Department of Mathematics, Panchmura Mahavidyalaya at around 11:15 am. Next, the inaugural address was delivered by **Dr. Anal Biswas**, the Principal of Panchmura Mahavidyalaya.

Key Note Address:

The event comprised of three consecutive talks. The first talk was delivered by **Dr. Prasanta Chatterjee**. He had introduced the theory behind ODEs, PDEs and nonlinear differential equations lucidly; gradually he described stochastic differential equation (SDE), fractional differential equation (FDE) and delay differential equation (DDE) and significance to solve problems like population dynamics, epidemics, genetic regulation, and biochemical reaction network behavior. Second talk was given by **Dr. Bappa Das**, who described applications of nonlinear differential to

deal with different research topics in oceanography, nonlinear optical fibers, plasmas, ferrite magnetic material, fluid dynamics and atmosphere, microwave oscillation, financial system. The third resource person was **Dr. Uday Narayan Ghosh**; he had described recent advancements in the theory and applications in the field of differential equations.

Interactive Session:

There were total 76 participants, which include students and teaching-nonteaching staffs. Students raised several questions after individual lecture. Speakers addressed individual question satisfactorily.


Vote of Thanks:

The programme ended around 3.00 PM with the vote of thanks given by **Dr. Tusar Kanti Das**, the Convener of the seminar and Assistant Professor in the Department of Mathematics, Panchmura Mahavidyalaya.

Outcome of the seminar:

- Discussion on the theory, types, methods to solve nonlinear differential equation,
- Applications of nonlinear differential equations in the analysis of different problems related to real life.

Panchmura Mahavidyalaya
Panchmura:Bankura



One-Day National Level Seminar on
"Recent Development of Differential Equations and Applications"
15th June 2023(Thursday)
Organized by
Department of Mathematics (UG & PG)

Panchmura Mahavidyalaya
**** Invitation ****

Respected

Sir/Madam and beloved students in the intellectual field from all corners, we feel immense pleasure to declare that the Department of Mathematics (UG &PG) is going to organize One-Day National Level Seminar on 'Recent Development of Differential Equations and Applications' on 15th June, 2023. We earnestly solicit your active association in the program. Also we are expecting research article for presentation in the seminar from all Academicians, Researchers and students.

With warm regards,
Dr. Anal Biswas
Principal & Chief Patron
Panchmura Mahavidyalaya

About the Seminar

The theory of linear and nonlinear, ordinary (ODE) and partial differential equations (PDEs), both stationary and evolutionary, is of fundamental importance in mathematical analysis, and thanks to recent breakthroughs and insights, it has reached a point where it can productively address a number of difficult and significant questions. Recent advancements in differential equations include both theoretical advances and applications in a variety of fields. Stochastic Differential Equations (SDEs): SDEs involve randomness and have been studied extensively in recent years. Modeling systems with inherent uncertainty, such as financial markets, population dynamics, and biological processes, employs these techniques. Fractional Differential Equations (FDEs): By permitting fractional derivatives, FDEs generalise classical differential equations. Due to their ability to model phenomena with long memories and non-local behaviours, they have acquired popularity. Visco-elasticity, diffusion processes, and signal processing are examples of applications. Delay Differential Equations (DDEs): DDEs characterise systems in which the derivative of a variable is dependent on its previous values. Applications can be found in biology, physics, and engineering, particularly in the modelling of time delays and feedback mechanisms. Numerical Methods for Differential Equations: Significant progress has been made in the development of efficient and accurate numerical methods for solving differential equations. These include adaptive algorithms, high-order finite difference and finite element methods, spectral methods, and mesh-free methods like radial basis functions.

Differential equations continue to play a crucial role in mathematical biology for modelling biological systems. They are utilised to examine population dynamics, epidemics, genetic regulation, and biochemical reaction network behaviour. Differential equations are indispensable to climate modeling and the study of climate change. They assist in describing atmospheric and oceanic circulation patterns, thermal transfer, and interactions between various Earth system components.

In the research fields oceanography, nonlinear optical fibers, plasmas, ferrite magnetic material, fluid dynamics and atmosphere, microwave oscillation, financial system, physicists try to understand the relations with nature which is dealing with the most interesting wave appearance that is coming from nowhere and pass out of site without any trace by framing differential equations. Disasters, which is a consequence of disruptions of nonlinear systems in nonlinear optical fibers, plasmas, fluid dynamics and atmosphere, financial system are the harmful effect. Its appearance and disappearance in these field of study is too much significant to predict, so that by amplifying signals physicists can control the intensity of the disasters and its effect.

The solutions of the above mentioned types of differential equations are therefore needed to develop all these related research fields. Recently, nonlinear partial differential equations, time fractional differential equations are solved and these solutions explore amazing features.

Important Announcements

- Last date for submission of abstract (300 words)- 10/06/2023
- Last date for submission of full length paper - 14/06/2023, 5pm.
- Last date for registration- 14/06/2023, 5pm
- Email id for send abstract and full paper- pmmathematics2020@gmail.com
- File format should be in Word, Pdf, Latex (TeX)
- Mention your affiliation in abstract and full paper
- All presented papers in the seminar will be published after proper review with ISBN.
- Registration link: <https://forms.gle/5SuYH1P3NMIkcChE>
- Registration fees-
 - Participation with paper presentation(Rs. 1000/-)
 - Participation without paper presentation(Rs. 200/-)
- Payment link-
 - UPI- 8918042886@ybl
 - A/C Pay - Tushar Kanti Das, A/C no- 30333338744, IFSC- SBIN0002121, Bank name- SBI Branch name- Sandiskhetan

Chief Patron



Dr. Anal Biswas, Principal, Panchmura Mahavidyalaya

Chief Guest



Prof. Prasanta Chatterjee, Ex-Head, Department for Mathematics, Visva-Bharati, West Bengal

Keynote Speaker



Dr. Bappa Das, Head, Department of Mathematics, Bankura University, West Bengal

Invited Speaker



Dr. Uday Narayan Ghosh, Head, Department of Mathematics, Munger University, Bihar

Organizing Committee

Dr. Anal Biswas, Chief Patron
Principal, Panchmura Mahavidyalaya

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Brochure of the seminar [Note: Date was postponed by one day due to strike initiated by local tribals]



Inaugural session: felicitation of delegates

Link: <https://www.facebook.com/100017890325595/videos/913486363244120/>

<http://www.panchmuramahavidyalaya.org/Default.aspx?PageId=538>

<http://www.panchmuramahavidyalaya.org/UploadedFiles/304891Aseminar3.pdf>



Keynote talk by Dr. Prashanta Chatterjee

Tushar Kanti Das.

Dr. Tusar Kanti Das

(Convener of the Seminar & Assistant Professor, Department of Mathematics, Panchmura Mahavidyalaya)