



PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON INTEGRATING BASIC SCIENCES & HUMANITIES

ICIBSH-2025

Editors

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Dr. D. Senthil Kumar

Dr. C. Hazarathaiah Yadav

Dr. P. Revathi

Date: 21st & 22nd March 2025



 A large blue banner with a yellow curved bottom edge. It features the Vel Tech logo and accreditation badges (NAAC A++ and UGC Category 1) at the top left. The main text in the center reads:

SCHOOL OF SCIENCE AND HUMANITIES
FRESHMAN ENGINEERING
 (MATHEMATICS, PHYSICS, CHEMISTRY, ENGLISH)
 organizes an
INTERNATIONAL CONFERENCE ON
INTEGRATING BASIC SCIENCES
& HUMANITIES
ICIBSH - 2025

 Below the text is an illustration of laboratory glassware, a microscope, and a smartphone. A yellow horizontal bar contains the dates:

21st & 22nd MARCH, 2025

 The bottom section of the banner is dark blue and contains the following text:

HYBRID MODE
 DAY 01: OFFLINE
 DAY 02: ONLINE


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School of Science and Humanities
cordially invite you to the
Inaugural Session on


“INTERNATIONAL CONFERENCE ON INTEGRATING BASIC SCIENCES AND HUMANITIES”

ICIBSH – 2025



Guest of Honor
Prof. Pascal Lorenz,
University of Haute Alsace,
Colmar - France.

Chief Guest
Prof. Sundresan Perumal,
University Sains Islam Malaysia



📍 ECE Gallery Hall
21st
March
2025
@ 9:00 AM

Advisors

- Prof. R. Sivaraman**
Pro-Vice Chancellor (Administration)
- Prof. E. Kannan**
Registrar
- Prof. S. Raju**
Dean-Academics

Convener

- Dr. G. Guna Sekaran**
Dean-FME

Co-Conveners

- Mr. Vijay Albert William**
Head-FME
- Dr. J. Viswanath**
HoD-Mathematics
- Dr. D. Senthilkumar**
HoD-Physics
- Dr. C. Hazarathaiah Yadav**
HoD-Chemistry
- Dr. R. Revathi**
HoD-English

With the Blessings of
Col. Prof. Vel Dr. R. Rangarajan
Founder President & Chancellor

Dr. Sagunthala Rangarajan
Foundress President

Prof. Dr. Rajat Gupta
Vice Chancellor

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AGENDA

- 9:00 am** **Tamil Thai Vaazhthu**
- 9:01 am** *Welcome address by*
Dr. R. Revathi
Associate Professor & Head, Department of English
- 9:03 am** **Lighting Kuthuvilakku**
- 9:05 am** *About ICIBSH-2025*
Dr. G. Guna Sekaran
Dean-FME
- 9:08 am** *Felicitation address & Release of Conference Proceedings*
Prof. Rajat Gupta
Vice Chancellor
Prof. R. Sivaraman
Pro-Vice Chancellor (Administration)
Prof. E. Kannan
Registrar
Prof. S. Raju
Dean-Academics
- 9:20 am** *Introduction of the Guests*
Dr. J. Viswanath
Professor & Head, Department of Mathematics
&
Dr. C. Hazarathaiyah Yadav
Professor & Head, Department of Chemistry
- 9:24 am** *Key note address*
Prof. Pascal Lorenz
University of Haute Alsace, Colmar - France.
&
Prof. Sundresan Perumal
University Sains Islam Malaysia.
- 9:45 am** *Vote of Thanks*
Dr. D. Senthilkumar
Associate Professor & Head, Department of Physics.

Followed by National Anthem



VALEDICTORY AGENDA

(22 March 2025)

MS Teams: <https://tinyurl.com/r27vaert>

3:00 PM **Tamil Thai Vaazhthu**

3:02 PM

Welcome address by

Dr. R. Revathi

Associate Professor & Head, Department of English

3:08 PM

Valedictory Address

Prof. R. Sivaraman

Pro-Vice Chancellor (Administration)

Prof. S. Raju

Dean Academics

3:20 PM

Participants Feedback

3:25 PM

Vote of Thanks

Dr. D. Senthilkumar

Associate Professor & Head,
Department of Physics.

Followed by National Anthem



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- ❖ *PROGRAM AT A GLANCE*
- ❖ *MESSAGES*
- ❖ *PLENARY TALKS*
- ❖ *INVITED TALKS*
- ❖ *CONTRIBUTED PAPERS*

DAY: 1 FRIDAY, 21 st MARCH 2025 [offline]	
9.00-9.20 am	ICIBSH CONFERENCE INAUGURATION
9.24-9.34 am	PLENARY TALK -I
9.34-9.44 am	PLENARY TALK -II
9.34-9.44 am	VOTE OF THANKS
9.45-10.00 am	INVITED TALK-I
10.00-11.00 am	TECHNICAL SESSION-I
11.00-11.15 am	TEA BREAK
11.15-12.15 pm	TECHNICAL SESSION-II
12.15-1.15 pm	LUNCH
1.15-2.00 pm	INVITED TALK-II
2.00-3.00 pm	TECHNICAL SESSION-III
3.00-3.15 pm	TEA BREAK
3.15-4.15 am	TECHNICAL SESSION-IV

DAY: 2 FRIDAY, 22 nd MARCH 2025[online]	
9.00-10.00 am	INVITED TALK-III
10.00-11.15 am	TECHNICAL SESSION-V
11.15-11.30 am	TEA BREAK
11.30-12.30 pm	TECHNICAL SESSION-VI
12.30-1.15 pm	LUNCH
1.15-2.00 pm	INVITED TALK-IV
2.00-2.45 pm	TECHNICAL SESSION-IV
2.45-3.00 pm	TEA BREAK
3.00-3.30 pm	VALEDICTORY FUNCTION

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Chancellor Message

It is with great pleasure and pride that I welcome you to the **International Conference on Integrating Basic Sciences and Humanities (ICIBSH-25)**, organized by the **School of Science and Humanities, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology**. This conference serves as a significant platform for academicians, researchers, and industry professionals to exchange knowledge, share meaningful discussions and collaborations between the various fields of Mathematics, Physics, Chemistry, and English, highlighting their interconnectedness in solving real-world problems, innovative research in interdisciplinary areas aiming for the advancement of science, technology, and literature.

At Vel Tech, we are committed to foster an environment that nurtures critical thinking, analytical skills, and creative problem-solving approaches across diverse academic areas. **ICIBSH- 25** reflects our vision to bridge the gap between academia and industry by encouraging thought leadership and collaborative research. I wish all participants to engage actively, present groundbreaking insights, and forge meaningful collaborations that will reshape the way we understand and address complex scientific, technological, and societal challenges, fostering innovation in education, research, and beyond.

Wishing you all an enriching and successful conference!

Best Regards,

Col. Prof. Vel. Dr. R. Rangarajan
Chancellor



Chairperson and Managing Trustee Message

It is with immense pleasure and pride that I welcome you all to the International **Conference on Integrating Basic Sciences and Humanities (ICIBSH-25)**, organized by the **School of Science and Humanities**. This conference provides a valuable platform for academicians, researchers, and industry professionals to exchange knowledge and collaborate across Mathematics, Physics, Chemistry, and English, emphasizing their interconnectedness in addressing real-world problems. It also promotes innovative research in interdisciplinary fields, advancing science, technology, and literature. Vel Tech University is dedicated to fostering critical thinking, analytical skills, and creative problem-solving across diverse academic disciplines. ICIBSH-25 represents our vision of connecting academia and industry through collaborative research.

I appreciate the School of Science and Humanities for organizing this exceptional event and creating an invaluable platform for intellectual collaboration. I urge all participants to actively engage, share their expertise, and forge new collaborations that will transform our approaches to complex scientific, technological, and societal challenges, while driving innovation in education, research, and beyond. Wishing **ICIBSH-25** immense success and hoping this conference sparks groundbreaking contributions across interdisciplinary fields, propelling advancements in science, technology, and the humanities.

Best Regards,

Dr. Rangarajan Mahalakshmi Kishore

Chairperson and Managing Trustee



Vice-Chancellor Message

I am delighted to acknowledge the support extended by **Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology** to the **International Conference on Integrating Basic Sciences & Humanities (ICIBSH-2025)**, scheduled for March 21st and 22nd, 2025, in Chennai.

This conference stands as a powerful reflection of our unwavering commitment to excellence and innovation within the fields of Basic Sciences and Humanities. As we unite to celebrate our collective achievements and share valuable knowledge, I am reminded of the pivotal role Basic Sciences play in shaping the future of engineering education, research, and overall societal development. The breakthroughs we make today will undoubtedly illuminate the path to a brighter tomorrow.

I would like to commend the organizers of ICIBSH-2025 for their outstanding efforts in bringing together experts from academia, research, and industry. This gathering provides an invaluable opportunity to exchange ideas, foster innovation, and explore new horizons.

I encourage all participants to fully embrace this platform and engage in meaningful discussions that will help push the boundaries of knowledge and progress.

Wishing the conference great success and I look forward to the insightful conversations and impactful outcomes that will emerge from this gathering.

Best Regards,

Prof. Dr. Rajat Gupta
Vice-Chancellor



Pro-Vice Chancellor Message

It is with great pleasure and enthusiasm that I extend my warmest greetings to all participants of the **International Conference on Integrating Basic Sciences & Humanities (ICIBSH - 2025)**, hosted by the **School of Science and Humanities, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology**. This esteemed conference stands as a testament to our institution's commitment to fostering interdisciplinary research and academic excellence.

In an era of rapid scientific advancements and evolving societal challenges, the integration of **Mathematics, Physics, Chemistry, and English** plays a pivotal role in shaping the future of education and research. ICIBSH - 2025 provides an invaluable platform for researchers, scholars, and academicians to engage in meaningful discussions, exchange innovative ideas, and contribute to the ever-expanding body of knowledge.

I commend the organizers, faculty members, and contributors for their dedication in making this conference a resounding success. The research presented in these proceedings reflects the depth of scholarship and the drive for innovation that defines our academic community.

I encourage all participants to make the most of this opportunity to collaborate, learn, and inspire one another. Wishing you all a fruitful and intellectually enriching experience at **ICIBSH - 2025**.

Best regards,

Prof. Dr. R. Sivaraman
Pro-Vice Chancellor



Registrar Message

I am honoured to extend my warmest greetings to all the distinguished guests, esteemed researchers, faculty members, and enthusiastic participants of the **International Conference on Integrating Basic Sciences & Humanities (ICIBSH - 2025)** organized by the **School of Science and Humanities, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology**.

At Vel Tech, we strongly believe in the power of interdisciplinary collaboration to drive innovation and academic excellence. This conference serves as a dynamic platform for scholars, industry experts, and young researchers to exchange ideas, explore emerging trends, and engage in thought-provoking discussions in the fields of **Mathematics, Physics, Chemistry, and English**.

The hybrid nature of this event ensures global participation, enabling knowledge dissemination beyond geographical barriers. I encourage all participants to take full advantage of this opportunity to present their research outcomes, engage in insightful dialogues, and foster meaningful collaborations that contribute to the advancement of science and humanities.

I extend my heartfelt appreciation to the organizers, faculty members, and supporting staff for their relentless efforts in making this event a grand success. I wish all the participants to have fruitful discussions and an enriching experience at **ICIBSH - 2025**.

Best Regards,

Prof. Dr. E. Kannan
Registrar



Dean – Academics Message

It is with great enthusiasm that I extend my warmest greetings to all participants of the **International Conference on Integrating Basic Sciences & Humanities (ICIBSH - 2025)**, organized by the **School of Science and Humanities, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology**. This conference is a remarkable initiative aimed at fostering intellectual growth, interdisciplinary collaboration, Interaction on emerging research areas and knowledge dissemination in the fields of **Mathematics, Physics, Chemistry, and English**.

In today's rapidly evolving academic landscape, integrating basic sciences and humanities is crucial for addressing global challenges and shaping innovative research. This conference provides an exceptional platform for scholars, researchers, and academicians to share their insights, present their findings, and engage in discussions that will contribute to academic excellence and societal progress.

I commend the dedicated efforts of the organizing committee, faculty members, and participants who have contributed to the success of this conference. I encourage all attendees to make the most of this opportunity to expand their knowledge, exchange ideas, and establish meaningful collaborations.

Wishing you all a productive and insightful experience at **ICIBSH - 2025**.

Best regards,

Prof. Dr. Raju Shanmugam

Dean-Academics



Convenor Message

It is an immense pleasure to be a part of the International Conference on Integrating Basic Sciences & Humanities: **ICIBSH-2025**, during 21st, 22nd March, 2025 at **Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology**.

The theme of **ICIBSH-2025** is Imagine/ Innovate/ Ignite/Inspire reverberates with the idea of the nation building and the immense potential that is being unleashed by the research boom.

ICIBSH-2025 is the ideal place to integrate the Basic Sciences and Humanities. Here everyone can update oneself with the latest developments in Science and Technology. They can network with the innovators and professionals from across the nation.

Wish the organizers a grand success and I sincerely hope that all the attendees will immensely benefit from the event and everyone right from a student to end user of science to professionals will have a bagful to take home.

My special Thanks to all technical paper contributors, invited speakers and the delegates.

Best Regards,

Prof. Dr. G. Guna Sekaran
Dean-Freshman Engineering



PLENARY TALKS

Plenary Talk-I



Prof. Pascal Lorenz
 University of Haute-Alsace
 France

Biography: Pascal Lorenz (lorenz@ieee.org) received his M.Sc. (1990) and Ph.D. (1994) from the University of Nancy, France. Between 1990 and 1995 he was a research engineer at World FIP Europe and at Alcatel-Alsthom. He is a professor at the University of Haute-Alsace, France, since 1995. His research interests include QoS, wireless networks and high-speed networks. He is the author/co-author of 3 books, 3 patents and 200 international publications in refereed journals and conferences. He was Technical Editor of the IEEE Communications Magazine Editorial Board (2000-2006), IEEE Networks Magazine since 2015, IEEE Transactions on Vehicular Technology since 2017, Chair of IEEE ComSoc France (2014-2020), Financial chair of IEEE France (2017-2022), Chair of Vertical Issues in Communication Systems Technical Committee Cluster (2008-2009), Chair of the Communications Systems Integration and Modeling Technical Committee (2003-2009), Chair of the Communications Software Technical Committee (2008-2010) and Chair of the Technical Committee on Information Infrastructure and Networking (2016-2017), Chair of IEEE/ComSoc Satellite and Space Communications Technical (2022-2023), IEEE R8 Finance Committee (2022-2023), IEEE R8 Conference Coordination Committee (2023). He has served as Co-Program Chair of IEEE WCNC'2012 and ICC'2004, Executive Vice-Chair of ICC'2017, TPC Vice Chair of Globecom'2018, Panel sessions co-chair for Globecom'16, tutorial chair of VTC'2013 Spring and WCNC'2010, track chair of PIMRC'2012 and WCNC'2014, symposium Co-Chair at Globecom 2007-2011, Globecom'2019, ICC 2008-2010, ICC'2014 and '2016. He has served as Co-Guest Editor for special issues of IEEE Communications Magazine, Networks Magazine, Wireless Communications Magazine, Telecommunications Systems and LNCS. He is associate Editor for International Journal of Communication Systems (IJCS-Wiley), Journal on Security and Communication Networks (SCN-Wiley) and International Journal of Business Data Communications and Networking, Journal of Network and Computer Applications (JNCA-Elsevier). He is senior member of the IEEE, IARIA fellow and member of many international program committees. He has organized many conferences, chaired several technical sessions and gave tutorials at major international conferences. He was IEEE Com Soc Distinguished Lecturer Tour during 2013-2014.



KEY NOTE TOPIC: *Advanced Architecture for Next Generation Wireless Networks*

In this talk, Prof. Pascal will discuss the future of wireless networks, focusing on the next generation of connectivity, such as 5G and beyond. As the world becomes more connected, faster and more reliable networks are crucial. Prof. Pascal will explain how new technologies like network slicing, massive MIMO, and millimeter-wave communications will help meet the growing demand for high-speed, low-latency connections.

These advanced technologies will allow networks to handle more devices and data while providing tailored services for industries like healthcare, autonomous driving, and smart cities. AI will also play a key role by helping optimize network performance and ensure reliable, seamless connections.

Prof. Pascal's talk will highlight how these innovations will shape the future of wireless communication, enabling faster, smarter, and more efficient networks.



Plenary Talk-II



Prof. Sundresan Perumal
 University Sains Islam Malaysia (USIM)
 Malaysia

Biography: Dr. Sundresan Perumal is a highly accomplished academic, researcher, and cybersecurity expert with a strong background in computer science, digital forensics, networking, and cybersecurity. Currently serving as a Senior Lecturer and Deputy Director (Innovation, Product Development, and Commercialization) at University Sains Islam Malaysia (USIM), he has made significant contributions to higher education, research, and industry collaboration. He holds a Ph.D. in Science and Technology from USIM, a Master's degree in Networking from Limkokwing University of Creative Technology, and a Bachelor's degree in Computer Science from Excelsior College, USA.

With over two decades of professional experience, Dr. Sundresan has held key academic positions at institutions such as KDU University College, Limkokwing University, and Cosmopoint College, where he has played an instrumental role in curriculum development, faculty leadership, and research supervision. His expertise spans network security, cybercrime investigations, IoT security, digital forensics, and ethical hacking, making him a highly sought-after specialist in his field. His research has not only contributed to academia but also directly benefited law enforcement agencies, particularly the Royal Malaysian Police (Commercial Crime Unit), where he provides expert consultation in forensic investigations, cyber law enforcement, and cybercrime analysis.

Dr. Sundresan has an extensive research portfolio, having published over 40 indexed journal papers, book chapters, and conference proceedings. His work has been recognized with multiple government and industry-funded research grants, including prestigious awards from FRGS, PRGS, and RACER funding bodies. Additionally, he holds several patents and copyrights related to digital forensic tools, IoT security frameworks, and cybersecurity innovations. Beyond academia, he actively engages in industry collaborations, offering expert consultation for organizations in cybersecurity, digital forensic investigations, and forensic software development.

A distinguished keynote speaker and trainer, Dr. Sundresan has delivered lectures and conducted cybersecurity workshops at national and international conferences. He holds numerous professional certifications, including Certified Ethical Hacker (CEH), Computer Hacking Forensic Investigator (CHFI), and EC-Council Certified Security Analyst. He is also



a recognized member of Lembaga Teknologis Malaysia, Malaysian Research Managers Association (MYRMA), and Internet Society Malaysia. His dedication to academic excellence and cybersecurity advancements has earned him several accolades, including Gold and Silver Medals at international innovation expos (PECIPTA, ITEX, and MTE). As a mentor and educator, he has successfully supervised Ph.D. and MSc students in cybersecurity and digital forensics, shaping the next generation of cybersecurity professionals.

With a passion for innovation, digital security, and academic excellence, Dr. Sundresan continues to lead impactful research and contribute to cutting-edge cybersecurity advancements, ensuring a safer digital environment for individuals and organizations alike.

KEY NOTE TOPIC: *Revolutionizing Humanities and Science: Unleashing the Power of Innovation and AI*

In this talk, Prof. Sundresan will explore how artificial intelligence (AI) is transforming both the humanities and sciences. Traditionally, the humanities have focused on studying culture, history, and society. With AI, scholars can now analyze large amounts of data, such as historical texts or social patterns, in ways that were not possible before. For example, AI tools can examine centuries of literature to uncover new insights or identify biases in societal narratives.

In the sciences, AI is revolutionizing fields like healthcare, climate science, and genomics. Prof. Sundresan will explain how AI helps scientists analyze massive datasets, make predictions, and discover new solutions faster than ever. AI-powered systems are already being used to find new medical treatments, predict climate changes, and explore new scientific frontiers.

Ultimately, Prof. Sundresan's talk will show how AI can bring a deeper understanding of both the natural world and human culture. By combining technology with humanistic studies, we can uncover new knowledge that improves our lives and our understanding of the world.



INVITED TALKS

Invited Talk-I



Dr. Said Broumi
 Faculty of Science Ben M'Sik
 University Hassa II, Morocco

Biography: Dr. Broumi Said completed his MSc and PhD in Computer Science from University of Hassan II of Casablanca, Morocco. Currently, he is serving as an Assistant Professor at Regional Center for the Professions of Education and Training, Casablanca-Settat, Morocco. He is permanent member at Laboratory of Information Processing, Faculty of Science Ben M'Sik, University Hassan II, Casablanca, Morocco. His research interests are in the field of graph theory, extended fuzzy graphs, decision analysis and neutrosophic theory. He has diversity in his research work. he has published several works on neutrosophic graph theory, soft set theory, multi-attribute decision analysis and some alternative theories of Neutrosophic Mathematics. He has published more than 200 research articles in international peer-reviewed ISI Indexed /Impact factor journals. Some of his papers have been published in high impact journals including, Complex & Intelligent Systems, Computational and Applied Mathematics, Symmetry, and Journal of Neutrosophic Set and Systems. His work has largely been cited and total citation is more than 5992 (Scholar Google, H-index 41). He has presented his research work at some national as well as international conferences. He has presented his research work at some national as well as international conferences. He has been acting as a reviewer for a number of international journals. He is also an Editor in chief of the journals International Journal of Neutrosophic Set and Systems and International Journal of Neutrosophic Science. His fields of Interest are Graph Theory, Neutrosophic Mathematics, Neutrosophic Graph Theory, Multi-Attribute Decision Analysis and Soft set theory.



ABSTRACT

The Neutrosophic Revolution: A New Approach to Handling Uncertainty

Said Broumi

Faculty of Science Ben M'Sik
University Hassa II, Morocco

This presentation explores the concept of neutrosophic sets and neutrosophic logic, mathematical frameworks designed to handle uncertainty, imprecision, and indeterminacy that often arise in real-world problems. We begin by introducing the fundamental principles of neutrosophic sets, highlighting their ability to represent truth, indeterminacy, and falsehood independently, and contrasting them with fuzzy sets and intuitionistic fuzzy sets. We illustrate neutrosophic logic with concrete examples demonstrating its application in decision-making and reasoning under uncertainty. Further, we delve into the geometric representation of neutrosophic sets, particularly the Neutrosophic Cube, providing a visual and intuitive understanding of the interplay between truth, indeterminacy, and falsehood. The presentation then examines various extensions of the neutrosophic set, including single-valued neutrosophic sets and interval neutrosophic sets, each tailored to specific types of uncertainty. A review of real-world applications demonstrates the versatility of neutrosophic sets across diverse domains, such as multi-criteria decision making, image processing, medical diagnosis, and data mining. Finally, we discuss available neutrosophic tools, providing a perspective on the current computational resources available for neutrosophic analysis. This overview provides a comprehensive introduction to neutrosophic sets and their potential for addressing complex problems characterized by incomplete or inconsistent information.

Invited Talk-II



Dr. Suresh Rasappan
 University of Technology and Applied
 Sciences – Ibri
 Sultanate of Oman

Biography: Dr. R. Suresh is a distinguished mathematician and academic with a Ph.D. in Mathematics from Vel Tech Dr. RR & Dr.SR Technical University, Chennai, specializing in "Global Chaos Synchronization of Chaotic and Hyperchaotic Systems using Nonlinear and Backstepping Control." With over 18 years of teaching and research experience, he currently serves as a Senior Lecturer at the University of Technology and Applied Science- Ibri, Oman.

His career spans roles as Professor, Associate Professor, and Head of the Department at Vel Tech University, where he guided numerous doctoral theses on mathematical modeling in complex systems like mosquito life cycles, HIV dynamics, and nitrogen mass cycles. His research projects, funded internationally, include AI-driven healthcare solutions and innovative mathematics lab designs. Dr. Suresh has published extensively, with over 100 research papers in reputed journals, focusing on chaos theory, neural networks, mathematical modeling, and control systems. He has received accolades such as the "Best Paper Award" and "Best Scopus Prolific Author" from the University of Technology and Applied Sciences, Oman.

An expert in MATLAB, LaTeX, R, and Vedic mathematics, Dr. Suresh excels in outcome-based education, curriculum design, and student mentoring. He holds certifications in R programming, numerical methods, biostatistics, and machine learning from NPTEL, MATLAB, and Coursera.

In addition to his academic pursuits, Dr. Suresh serves as an editorial member for international journals like *Computational and Mathematical Methods*, published by Hindawi (John Wiley & Sons). His unwavering dedication to mathematical research and education continues to inspire and shape future scholars worldwide.



ABSTRACT

Linear Algebra in Artificial Intelligence

Suresh Rasappan

Mathematics Section, University of Technology and Applied Sciences - Ibri
Post Box- 466, Postal Code-516, Ibri, Sultanate of Oman.

Introduction to Linear Algebra in AI

Linear algebra serves as a fundamental pillar in the field of Artificial Intelligence (AI), providing the mathematical framework necessary for handling and manipulating data efficiently.

Image Representation as a Matrix

In AI-driven image processing, images are treated as numerical data stored in matrix format. Each pixel in an image is assigned a numerical value, which forms the elements of a matrix.

Matrix Transformations: Rotation and Scaling

Matrix transformations play a crucial role in modifying images for AI applications. Two common transformations in image processing are rotation and scaling.

Singular Value Decomposition (SVD) and Principal Component Analysis (PCA)

Singular Value Decomposition (SVD) is a powerful linear algebra technique used in AI for image compression and dimensionality reduction. Principal Component Analysis (PCA), another dimensionality reduction method, leverages SVD to extract the most informative features from data, enhancing model performance by reducing noise and redundancy.

Fourier Transform in AI

Fourier Transform is a mathematical technique used in AI to analyze and process images in the frequency domain.

Convolutions in AI and Convolutional Neural Networks (CNNs)

Convolution operations are fundamental in AI, particularly in deep learning models such as Convolutional Neural Networks (CNNs).

Hands-on Session and Q&A

A practical hands-on session is essential for reinforcing the theoretical concepts of linear algebra in AI. Participants can experiment with image transformations such as rotation, scaling, and matrix decompositions to observe their effects on images.

Invited Talk-III



Dr. B Krishna Kumar

Department of Mathematics, School of Advanced Sciences
 Vellore Institute of Technology, Chennai, India.

Biography: Dr. B. Krishna Kumar, a retired Professor from the Department of Mathematics at Anna University, Chennai, is an esteemed academician with over 34 years of research and 28 years of teaching experience. He holds a Ph.D. in Applied Mathematics from the Indian Institute of Technology, Madras, specializing in stochastic processes and their applications.

Throughout his illustrious career, Dr. Kumar has guided numerous Ph.D. and M.Sc. students, contributing to groundbreaking research in applied probability, retrial queues, compartmental analysis, and queueing network models in communication theory. His work extends globally, collaborating with universities in Japan, Spain, Germany, Greece, Italy, Korea, and Russia.

Dr. Kumar has been honoured with prestigious fellowships, including those from CSIR, IIT Madras, and the National Board for Higher Mathematics, alongside a post-doctoral fellowship at Nippon Telegraph and Telephone Corporation in Tokyo, Japan. He remains an active member of the Indian Society for Probability and Statistics, the Operations Research Society of India, and Japan. His prolific research portfolio boasts over 75 publications in renowned international journals and conference proceedings, including the Journal of Operations Research Society of Japan, Annals of Operational Research, and Communications in Statistics. He has also served as a reviewer for numerous esteemed journals like the European Journal of Operations Research and IEEE Transactions on Automatic Control.

Beyond academia, Dr. Kumar has organized international workshops and conferences, contributing significantly to the global research community. His ongoing research delves into stochastic models for the Internet of Things, cognitive radio networks, and performance analysis of advanced queueing systems. A mentor, researcher, and global scholar, Dr. B. Krishna Kumar's legacy continues to inspire the next generation of mathematicians and scientists worldwide.



ABSTRACT

Matrix Geometric Techniques in Markovian Systems

B. Krishna Kumar

Department of Mathematics
School of Advanced Sciences
Vellore Institute of Technology
Chennai, India.

The main challenge in determining the stationary state probabilities of a Markov process is solving a set of linear, flow balance equations. Each state of the system is associated with one equation in this set. These equations can involve a large, or potentially infinite, number of structural properties. However, the structure of these equations is easily identified because they follow a repetitive pattern derived from the Markovian model. This repetition allows for a recursive solution to the repeating part of the process, giving it a geometric form. As a result, processes with this repetitive structure, which is essential for matrix geometric techniques, are commonly found in models of computer networks and communication systems.

Based on the above observations, we study a simple derivation of the matrix geometric solution form that is found in certain vector state Markov process that have a repeated structure. This solution form has a wide application in computer performance models, reliability system, biological models and so on. Matrix geometric techniques are applicable to both continuous and discrete time Markov processes. In the present talk, we will focus on continuous time matrix geometric processes. The approach is based on first principles and makes use of analogy to corresponding solutions found in scalar state processes.

Invited Talk-IV



Dr. R Sundareswaran
 Department of Mathematics
 Sri Sivasubramaniya Nadar College of Engineering
 Kalavakkam, Chennai

Biography: Dr. R. Sundareswaran is an Associate Professor in the Department of Mathematics at Sri Sivasubramaniya Nadar College of Engineering, Chennai, with over 18 years of teaching and 12 years of research experience. He holds a Ph.D. in Mathematics, specializing in vulnerability parameters in graphs, from Madurai Kamaraj University. His doctoral research, part of a Department of Science & Technology (DST) funded project, focused on "Domination Integrity in Graphs". Dr. Sundareswaran's research spans across graph theory, fuzzy graphs, combinatorics, discrete mathematics, and neutrosophic sets. He has authored over 50 research papers in internationally recognized journals, including 25 SCOPUS-indexed publications. He also serves as a research supervisor at Anna University. He has led multiple funded projects, including his latest as Principal Investigator, supported by SSN Trust and TNSCST, focusing on graph-theoretic approaches to analyze diabetic neuropathy. His current project for 2024-25, valued at Rs. 2,25,000, explores advanced mathematical models in collaboration with faculty from chemical engineering.

Dr. Sundareswaran is an active member of professional bodies such as the Society for Reliability and Safety and the Association of Discrete Mathematics and Applications. He is a reviewer for leading journals, including the American Mathematical Society, Arabian Journal of Chemistry, and TWMS Journal. He also serves on the editorial board of UDA Journal. Beyond research, Dr. Sundareswaran has organized and chaired numerous international conferences and workshops, including the 13th Annual ADMA Conference on Graph Algorithms and the 37th Annual Conference of the Ramanujan Mathematical Society. These events, sponsored by NBHM, DST, and SSN Trust, secured funding totalling over Rs. 36 lakhs.

With his unwavering passion for mathematical research and education, Dr. R. Sundareswaran continues to inspire and mentor future mathematicians, advancing knowledge in graph theory and its real-world applications.



ABSTRACT

Coalition in Graphs

R. Sundareswaran,

Department of Mathematics,

Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam – 603 110

The term coalition is used to describe a situation in which two or more groups agree to work together temporarily in a partnership to achieve a common goal, such as in parliamentary systems of government, when in a general election no political party achieves a clear majority. In such cases two or more parties form coalition cabinets which are supported by a parliamentary majority. Many countries often operate with coalition cabinets, including those in Scandinavia, Australia, Austria, Canada, France, England, Germany, Greece, India, Ireland, Israel, Japan, New Zealand, Switzerland, Thailand, Turkey, and the Ukraine. Although coalitions typically involve agreements between more than two political parties, we will only model situations in which coalitions are formed by two groups.

We extend the coalition concept in resolving sets. Resolving coalitions extend the concept of metric dimension by grouping vertices into coalitions that work together to resolve the graph. This enhances network design by allowing redundant paths and connections to ensure resilience. By partitioning vertices into resolving coalitions, we achieve a balance between minimality and redundancy in network communication.



Invited Talk-V



Dr. P Thangadurai
Centre for Nanoscience and Technology
Pondicherry University
Puducherry

Biography: Dr. P. Thangadurai is a distinguished researcher in the field of Materials Science and Engineering, with a strong focus on nanostructured materials and advanced electron microscopy techniques. His research interests include the fabrication and characterization of metal-oxide-semiconductor (MOS) devices using high-k materials like ZrO₂, HfO₂, and Al₂O₃, addressing challenges in semiconductor device performance at nanoscale dimensions. He also works on the synthesis of nanoparticles and quantum dots for applications in photocatalysis, bio-imaging, and gas sensing. With extensive expertise in high-resolution transmission electron microscopy (HRTEM), Dr. Thangadurai specializes in the structural and chemical analysis of both soft and hard materials. His work includes electron beam damage analysis in microelectronic devices and chemical analysis of thin films using advanced TEM techniques like EDS, EELS, and HAADF. Dr. Thangadurai has guided 7 completed Ph.D. theses and mentored 46 M. Tech projects, contributing significantly to the academic growth of his students. He has published 78 research papers and presented 80 papers at international conferences. He has also delivered 90 invited talks and attended 43 conferences, showcasing his active participation in the global scientific community. His research has led to the completion of 6 research projects, and he is currently involved in 3 ongoing projects. Through his work, Dr. Thangadurai has made valuable contributions to the development of advanced materials for modern technology, particularly in the fields of nanoelectronics and nanomaterials.



ABSTRACT

Exploring Advanced Materials Through Electron Microscopy

P. Thangadurai

Centre for Nanoscience and Technology
Pondicherry University
Puducherry - 605 014, India

Growth in materials research brought many wonders in science and technology. Shifting research from single crystalline materials to nanoscale materials make the need of new characterization techniques. When many advanced materials are under development, understanding them is also raising in parallel. It needs new investigation tools. Many research tools have been developed aiming to serve this purpose of exploring things at the nanoscale (typically 1 to 100 nm). Electron microscopy is one such tool, can be useful for imaging as well as for analytical spectroscopy. Limitation due to diffraction limit, optical microscopy cannot be used in the nanoscale regime to image and analyze nanomaterials and hence electron microscopy come into the picture. Electron microscopy can be done in stationary beam mode and in the scanning beam mode. In the cases where it probes the surface by using scanning electron beam, it is called as Scanning Electron Microscopy (SEM), whereas the transmitted beam is used in Transmission electron microscopy (TEM). High resolution microscopy, that can resolve atoms (Fig. 1) can be used to understand materials in a much better way. In addition to conventional electron microscopy techniques, new techniques have been achieved in the course of its development. Advanced techniques such as high angle annular dark field detection, energy filtered TEM, electron energy loss spectroscopy etc. added to the electron microscopes have improved the strength of electron microscopy in Nanoscience and Technology. In the presentation, basics of SEM and TEM along with some special applications to explore new materials will be discussed.

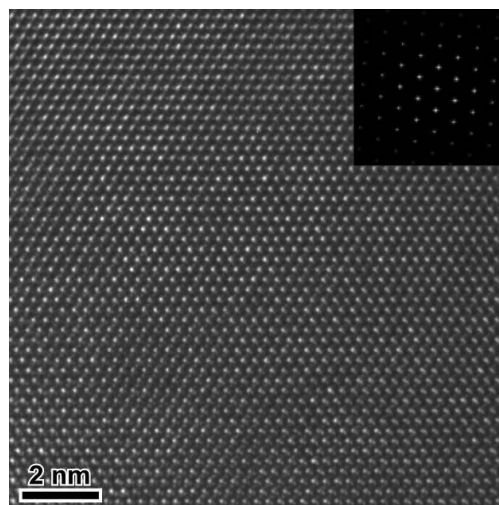


Figure 1: High resolution TEM micrograph of calcite crystal obtained from sea-urchin.



Invited Talk-VI



Dr. S GOKUL RAJ
Department of Physics
Pondicherry university
Kalapet
Puducherry

Biography: Dr. S. Gokul Raji is a renowned researcher and academician specializing in materials science, particularly in the synthesis and characterization of materials for technological applications. With over 20 years of research experience and 17 years of teaching experience, he has made significant contributions to the fields of optical, electrical, and magnetic materials. His research areas include single crystals, nano-phase formation, and thin films of semiconductor oxides and rare-earth materials. Dr. Gokul Raji has authored 116 international publications and presented 57 international conference papers. He has been a resource person at various workshops and FDPs and has served as convenor/co-convenor for 4 national/international workshops. His research has been funded by prestigious agencies such as DST-SERC and DRDO, and he currently leads ongoing projects in advanced materials research and crystal growth. He holds a patent for "Enhanced Piezoelectricity and Ferroelectricity in Ion Irradiated Triglycine Sulphate Crystals" (Patent No. 422980). Dr. Gokul Raji has been elected as a Fellow of The Academy of Sciences, Chennai and is a life member of several scientific societies, including the Indian Physics Association and the Magnetic Society of India. His international recognition includes being a session chair at ICMAT 2011 in Singapore and attending various prestigious FDPs and workshops. Additionally, Dr. Gokul Raji is actively involved in national examinations as an observer for exams like UGC-NET and JEE.



ABSTRACT

Advanced Materials for Sustainable Development

S. Gokul raj

Pondicherry university, Kalapet,
Puducherry

Sustainable development requires innovative materials that minimize environmental impact while maintaining high performance. Advanced materials such as biodegradable polymers, nanomaterials, and bio-based composites play a crucial role in achieving sustainability goals.

Advanced materials play a crucial role in various industries, offering innovative solutions to environmental and technological challenges. Biodegradable polymers, derived from renewable sources, naturally decompose, helping to reduce plastic waste. Examples include polylactic acid (PLA) and polyhydroxyalkanoates (PHA). Nanomaterials, designed at the nano scale, enhance efficiency and minimize material consumption in industries such as electronics, medicine, and energy storage. Bio-based composites, which incorporate natural fibers like hemp, flax, and jute as reinforcements in polymers, provide an eco-friendly alternative to synthetic materials. Smart materials, including self-healing polymers and shape-memory alloys, adapt to environmental changes, improving product longevity and efficiency. Additionally, aerogels and superinsulators significantly enhance energy efficiency in construction and industrial applications. Lastly, graphene and other two-dimensional materials, known for their exceptional strength and conductivity, are driving advancements in electronics, water purification, and energy storage [1-3].



Fig.1 – Materials have environmental impacts throughout their lifecycles. The major stages in a material’s lifecycle are raw material acquisition, materials manufacture, production, use/reuse/maintenance, and waste management [4].

Advanced materials find applications such as Construction, Energy Storage, Water Purification, Medical Applications and also in Transportation applications.

Despite their benefits, advanced materials face challenges such as high production costs, scalability, and regulatory hurdles. Future research focuses on improving cost-effectiveness, recyclability, and integrating these materials into mainstream industries. Advanced materials are essential for sustainable development, offering innovative solutions across multiple sectors. Continued investment in research and development will drive further advancements, contributing to a more sustainable and eco-friendly future.

Invited Talk-VII



Dr. Pumlianmunga
Department of Physics
Jamia Millia Islamia University
New Delhi

Biography: Dr. Pumlianmunga is an Associate Professor in the Department of Physics at Jamia Millia Islamia, New Delhi. He holds a Ph.D. in Physics from the Indian Institute of Science (IISc), Bangalore, with a thesis on the electrical switching of Te-based chalcogenide glasses. With over 14 years of academic experience, his research focuses on the experimental studies of thermal, electrical, and optical properties of amorphous materials, particularly for phase change memory applications. He has published numerous research papers in high-impact journals and has contributed to conferences globally, presenting on topics related to phase change materials and electrical switching. His recent research includes work on the reduction of write current and thermal stability in GeSe₂-doped films for memory applications. In addition to his research contributions, Dr. Pumlianmunga has supervised M.Sc. and Ph.D. students, guiding them on projects related to chalcogenide glasses and their applications. He is an active participant in Faculty Development Programs and has been involved in various administrative roles, including coordinating the Pre-Ph.D. seminar and serving as a placement coordinator in the Physics Department. He has also led a funded research project under the Science and Engineering Research Board (SERB) focusing on enhancing phase change memory properties, which received significant financial support. His academic service extends to roles such as member of the technical and sub-purchase committees and advisor to the Physics Association.



ABSTRACT

Chalcogenide materials for Phase Change Memory Devices

Pumlianmunga

Department of Physics, Jamia Millia Islamia University
New Delhi

Data storage and memory devices starting from the tape drives, HDD, SSD, NAND or NOR-based flash drives, SRAM and DRAM have been used from generation to generation. The memory hierarchy gap between present volatile and non-volatile memories can be filled with a storage class memory [1]. Non-volatile phase change memory (PCM) can be served as a potential and suitable candidate as a next-generation memory technology that mimics brain-inspired neuromorphic computing [2]. The PCM undergoes repeated amorphous phase (RESET) to crystalline phase (SET) transition by the application of an electrical pulse. Such materials demand a high data retention temperature of ~ 150 °C for a few years and a low RESET current [3]. To address such challenges, Sb_2Te_3 being one of the fast switchable materials, has been considered as a material to be employed in Neumann architecture. The new alloys $(\text{Sb}_2\text{Te}_3)_{1-x}(\text{GeSe}_2)_x$ ($x=0.06, 0.12, 0.18, 0.24, 0.3$) have been prepared and investigated for PCM, aiming at strong data retention improvement and decreased RESET current (fig. 1). The prepared alloys have been subjected to thermal, electrical, and structural properties studies. Increase in crystallization temperature after dopant addition improves the thermal stability. Ten years of data retention increased from 20.2 °C for $x = 0$ to 84.6 °C for $x = 0.3$. For $x = 0.3$, the activation energy for crystallization was observed to be 2.423 eV (1.53eV for $x=0$). Electro-thermal simulation by finite element analysis on $\text{GeSe}_2\text{-Sb}_2\text{Te}_3$ shows that the high-resistance materials produce more heat (fig. 2 & fig. 3), resulting in a lower write current in an energy-efficient PCM device [4].

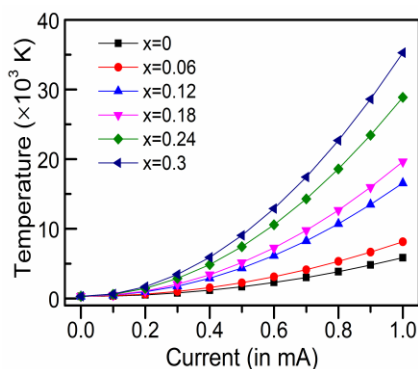


Fig.1-Temperature variation with applied current

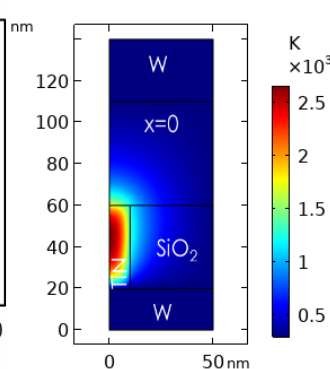


Fig.2 Spatial distribution of temperature inside Sb_2Te_3 memory cell

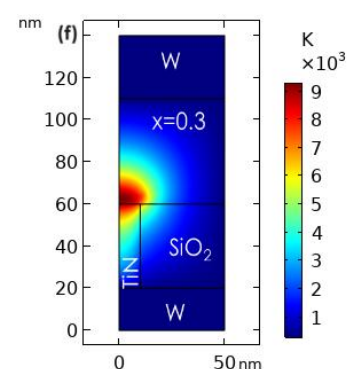


Fig.3 Spatial distribution of temperature inside Sb_2Te_3 (GeSe_2)₃

Invited Talk-VIII



Dr.A. Stanley Raj
Department of Physics
Loyola College
Chennai

Biography: Dr. A. Stanley Raj is an accomplished academic and researcher specializing in computational geophysics, machine learning, artificial intelligence, and environmental sustainability. With a Ph.D. in Physics (Geophysics) from Manonmaniam Sundaranar University, his research focuses on leveraging artificial neural networks, fuzzy logic, wavelet analysis, and nature-inspired algorithms for optimizing environmental studies, particularly groundwater and climate change research. As an Assistant Professor at Loyola College, Chennai, he has extensive teaching experience and has contributed significantly to student development, including serving as Placement Coordinator and Sports Coordinator. His research has led to the development of innovative models and tools for geophysical data analysis, including adaptive neuro-fuzzy systems for groundwater studies. Dr. Raj is also the founder of Infinite Bots, a startup focused on producing microplastic filtration systems for drinking water. In addition to his academic and research endeavours, Dr. Raj has actively contributed to national science and innovation policies, including the Loyola Innovation and Entrepreneurship Start-Up Policy (LINES). His leadership has extended to organizing and convening various academic workshops, talks, and conferences, further fostering scientific collaboration. Dr. Raj's work has led to several publications in reputed journals and books, along with patented inventions in fields ranging from organic fertilizers to stress detection devices. His passion for advancing scientific research, coupled with his commitment to environmental sustainability, makes him a distinguished figure in his field.



ABSTRACT

Physics-Informed Neural Networks (PINN) for monsoon variability prediction and climate resilience analysis and sustainability index assessment in southern peninsular India

Joseph Pious, Adityan, Stanley Raj
 Department of Physics
 Loyola College, Chennai

Rainfall plays a crucial role in shaping the climatic and hydrological systems of Southern Peninsular India, a region heavily dependent on monsoon patterns for water availability and ecological balance. This study introduces a dual-methodology framework that combines Exploratory Data Analysis (EDA) with a Physics-Informed Neural Network (PINN) to analyze rainfall variability and sustainability. EDA is employed to derive insights from historical precipitation datasets, identifying patterns, anomalies, and trends through statistical techniques. To complement this, a novel PINN model, inspired by Bernoulli's equation, is developed to enhance rainfall forecasting by integrating fluid dynamics principles with deep learning. By mapping the loss gradient to pressure changes, momentum to kinetic energy, and regularization to potential energy, the model ensures stable training convergence and robust performance. This research significantly contributes to sustainability by improving climate forecasting accuracy, which is essential for effective water resource management. The integration of physics-informed modeling with machine learning provides actionable insights that support adaptive planning in agriculture, water conservation, and climate resilience initiatives. The PINN framework helps optimize irrigation schedules, thereby reducing groundwater depletion and preventing soil degradation (Fig.1).

The study introduces the Sustainability Index (SI), a novel metric incorporating the Convergence Weight Index (WCI), Rainfall Anomaly Index (RAI), and Resilience Index (RI) to assess the long-term stability of rainfall patterns. RAI, calculated using standardized rainfall anomalies and percentage departures from normal, quantifies deviations from expected precipitation levels. RI, derived from recovery time analysis, autoregressive modeling, and the Hurst exponent, measures the ability of rainfall trends to return to normal after extreme events. Additionally, a Drought Resilience Index evaluates recovery speed based on cumulative deviations from long-term mean rainfall. Figures 2 and 3 represents the resilience index calculated using PINN for the years 1990-2014.

Enhanced drought prediction capabilities guide reforestation efforts, aiding in carbon sequestration and promoting ecosystem stability. Furthermore, the model's insights into rainfall recovery dynamics support infrastructure planning, such as the development of reservoirs and rainwater harvesting systems to mitigate the impacts of monsoon variability.



Invited Talk-IX



Dr. G H Gunasekar
CSIR- Indian Institute of Chemical Technology
Hyderabad

Biography: Dr. G.H. Gunasekar is a Scientist & Assistant professor in (AcSIR) CSIR-Indian Institute of Chemical Technology, Hyderabad. He has renowned Chemist with over 7 years of experience in the field. He specializes in inorganic chemistry, particularly in the field of catalysis. Dr. G.H. Gunasekar earned his Ph.D. from Prof. Sungho Yoon's group, Seoul, Republic of Korea, and has published over 20 research papers in peer-reviewed journals. He completed his postgraduate studies at the Clean Energy Research Centre, Korea Institute of Science and Technology, Seoul, Republic of Korea. He has above 180 total impact factors, 5 patents, and 2 book chapters. Throughout his career, he has been recognized with numerous awards, which include the Academic Excellence Award during Ph.D. studies granted by the Graduate School of Kookmin University, the CSIR-UGC Lectureship in the chemical science division in the year of 2013, and Qualified GATE in the chemistry division in the year of 2013. He served as Senior Research Officer, R&D Centre, Indian Oil Corporation Ltd., Faridabad, India and Research Executive, Orchid Chemicals and Pharmaceuticals Limited, Tamilnadu, India.



ABSTRACT

Global warming and CO₂ mitigation options

G.H. Gunasekar

Department of Catalysis & Fine Chemicals

CSIR-IICT, Tarnaka

Hyderabad

Global warming (GW) is the biggest global-scale issue facing humans in the century. The rapid accumulation of greenhouse gases (GHG), such as CO₂, CH₄, fluorocarbons, and N₂O, that trap heat in the earth's atmosphere causes GW, which leads to more destructive climate changes, including extreme droughts, wildfires, floods, tropical storms, and other disasters that are more widespread and costly to both our infrastructure and our health. Mitigating GHG emissions is indeed an inevitable action to address GW and climate change. Among GHG, CO₂ is the most significant contributor, accounting for about 76% of total GHG emissions. The most significant sources of CO₂ emissions are primarily from burning fossil fuels (coal, oil, and natural gas) for electricity and heat production, transportation, and industrial processes. In this talk, various CO₂ mitigation options are overviewed.



Invited Talk-X



Dr. P Muthu Mareeswaran
Department of Chemistry
Anna University
Chennai

Biography: Dr. P. Muthu Mareeswaran is an assistant professor in the Department of Chemistry, CEG campus, Anna University. He has 12 years of research experience and 10 years of teaching experience. Dr. P. Muthu Mareeswaran completed his Ph.D. and M.Phil. from Madurai Kamaraj University, Madurai, Tamil Nadu, India. He published over 64 research papers in peer-reviewed journals. He has above 816 citations from Google Scholar, 5 patents, 6 book chapters, and 3 edited books. He has completed two major projects related to carbon dioxide capture and electro/photoelectrochemical reduction using caliximadazole derivatives, DST INSPIRE project, grant amount - Rs. 35 lakhs, and carbon dioxide capture studies using polymers, RUSA 2.0, grant amount - Rs. 2.75 lakhs. He is qualified in the Graduate Aptitude Test for Engineering (GATE 2007).



ABSTRACT

Advances in Carbon dioxide Capture

P. Muthu Mareeswaran

Department of Chemistry

College of Engineering Guindy, Anna University

Chennai – 600 025

Climate change refers to significant and lasting changes in the Earth's climate, particularly an increase in global temperatures, largely due to human activities. The burning of fossil fuels (coal, oil, and natural gas) for energy and transportation releases large amounts of carbon dioxide (CO₂) and other greenhouse gases (GHGs) like methane (CH₄) and nitrous oxide (N₂O). Certain industrial activities release GHGs and other pollutants. Agriculture: Practices such as livestock farming produce methane, while the use of synthetic fertilizers releases nitrous oxide. Global warming leads to higher average temperatures, resulting in heatwaves. Glaciers and polar ice caps are melting, contributing to rising sea levels. Carbon dioxide (CO₂) Capture involves strategies and technologies aimed at reducing the amount of CO₂ released into the atmosphere and/or removing CO₂ from the atmosphere. Improving the efficiency of buildings, appliances, and industrial processes to use less energy. Transitioning to renewable energy sources such as solar, wind, hydro, and geothermal power to replace fossil fuels. Promoting electric vehicles, public transportation, biking, and walking to reduce emissions from the transportation sector. Implementing cleaner technologies and practices in manufacturing and other industrial activities. Capturing CO₂ emissions at their source (e.g., power plants, industrial facilities) before they are released into the atmosphere. Storing CO₂ underground in geological formations such as depleted oil and gas fields, deep saline aquifers, or using it in enhanced oil recovery (EOR). Technologies that capture CO₂ directly from the ambient air. Using biomass for energy and capturing the CO₂ emitted during the process, then storing it underground. Enhancing the ocean's ability to absorb CO₂ through methods like ocean fertilization or alkalinity enhancement.

Invited Talk-XI



Dr. Sathyaraj Venkatesan

Department of Humanities and Social Sciences
 National Institute of Technology (NIT)
 Tiruchirappalli, Tamil Nadu, INDIA

Biography: Dr. Sathyaraj Venkatesan is a Professor of English at the National Institute of Technology, Tiruchirappalli (NIT Trichy), specializing in Health Humanities **and** Graphic Medicine. His research focuses on the rhetorical potency of images in medical narratives, bioethics and the representation of illness in literature and popular culture.

He has authored or co-authored over 130 research articles and nine books, including *Pandemics and Epidemics in Cultural Representation* (Springer, 2022), *Infertility Comics and Graphic Medicine* (Routledge, 2021), and *Mental Disorders and Graphic Medicine* (Routledge, 2021). Two forthcoming books include *Drawing Pandemic: Graphic Medicine and COVID-19* (Palgrave Macmillan, 2025) and *Dementia and Graphic Medicine: Beyond the Living Death Narrative* (Routledge, 2025).

Dr. Venkatesan has delivered 90+ conference presentations, including keynote addresses and plenary talks. His research appears in prestigious indexed journals such as *British Medical Journal's Medical Humanities*, *Perspectives in Biology and Medicine*, and *Journal of Medical Humanities*. His essays have appeared in *The Hindu*, *The Caravan*, *Scroll*, and *The Telegraph*. He has published 100 research articles in Journals indexed by SCOPUS and Web of Science. He has visited 20 states in India and 14 countries worldwide.

He has received multiple awards and fellowships, including the Best Performer Award at NIT Trichy (2024, 2022, 2021, 2020), the Peter James Burns Scholarship (Graphic Medicine Conference, Ireland, 2024), and fellowships from Cornell University and IIT Kanpur.



ABSTRACT

Beyond Boundaries: Bridging Arts and Sciences for the Future

Sathyaraj Venkatesan

Department of Humanities and Social Sciences
National Institute of Technology (NIT)
Tiruchirappalli, Tamil Nadu, 620 015.

Abstract: Beyond Boundaries: Bridging Arts and Sciences for the Future revisits C. P. Snow’s seminal “two cultures” debate to underscore the growing relevance of post-disciplinary thinking in the 21st century. This presentation examines how emerging fields such as Health Humanities, Digital Humanities, and Climate Studies, among others, transcend conventional disciplinary boundaries to engage with pressing social and scientific concerns. Drawing on contemporary figures like Venkatraman Ramakrishnan, it reflects on the critical role of literature and the humanities in bridging these divides, fostering public dialogue, and encouraging ethical inquiry. Building on my research in Health Humanities, I explore how this field, in particular, addresses issues such as illness narratives, medical education, ethics, and intersectionality to produce socially engaged knowledge. Ultimately, the presentation argues for the continuing relevance of the humanities in helping us understand and respond to the complex global challenges of our time.



Invited Talk - XII



Dr. V Rajasekaran

Professor of English & Director Students Welfare
 School of Social Sciences and Languages
 Vellore Institute of Technology (VIT)
 Chennai

Biography: Dr. Rajasekaran is a Professor of English & Director Students Welfare at Vellore Institute of Technology, Chennai, Tamilnadu, India. Notably, he was honoured with the IATEFL Scholarship to attend the 52nd IATEFL International Conference at Brighton, UK in April 2018. Further, he is also the recipient of TESOL Travel grant to attend TESOL International Convention and Expo in Atlanta, Georgia, USA, in March 2019.

He has visited more than 15 countries, including England, Scotland, France, Netherlands, Belgium, Switzerland, Oman, Singapore, Malaysia, South Korea, Thailand and Sri Lanka. In addition, he also visited length and breadth of Indian states almost covering all the states of India.

Adding to this international presence, he has been a distinguished keynote speaker at conferences held in India, Singapore, Malaysia, and Thailand."

Notably, he serves as a Cambridge University Business English Certificate (BEC) Speaking Examiner and he is also a freelance trainer with British Council, India.

Dr Rajsekaran has successfully produced five Ph.D. candidates and is currently guiding eight more candidates pursuing their Ph.D. at VIT University's Chennai campus. Additionally, he serves on the editorial boards of numerous international journals.

Further, he manages a YouTube channel called 'Prof Dr Rajasekaran,' boasting over 25,000+ subscribers and garnering 10 million-plus views with 300+ research videos. Budding research scholars greatly benefit from his thought-provoking simple, and insightful videos, available in both English and Tamil languages.

His research acumen can be understood with his impressive track record 160 publications which include 6 books, 15 book chapters, 30 papers in Scopus indexed Journals in which 10+ papers in high impact factor journals and 40 papers in other international journals. He has participated at 31 International Conferences, 10 National Conferences, 10 seminars and 25 workshops. He is the most sought resource person and he has delivered more than 150 invited talks.

He strongly believes that Continuous Professional Development (CPD) is his USP. His passion includes travelling and photography.



ABSTRACT

Navigating Research Excellence: Effective Reading, Writing, and AI-Driven Insights

V. Rajasekaran

School of Social Sciences and Languages
Vellore Institute of Technology (VIT)
Chennai, Tamil Nadu, India.

The initial step in conducting academic research is learning how to read, analyze, and synthesize information in an organized manner. The keynote address outlines important techniques for dealing with systematic research papers. It will look into techniques that focus on speed reading, skimming, and critical reading for analyses so that the researcher is able to get the most important information quickly and easily. In addition, this session will discuss best practices in maintaining academic honesty when understanding literature reviews, preparing and paraphrasing literature reviews, and recognizing research gaps, which are the main components of a good research. Discovering the relevant research gap is crucial for formulating new ideas for research, and this address will define a rational approach for understanding gaps within academic disciplines.

The implementation of tools and solutions using Artificial Intelligence (AI) technology has modernized the research environment by simplifying literature review, summarization, citation harvesting, and ideation processes. AI-driven tools including summarizers, citation assistants, and research paper analysers offer unparalleled value and can boost the quality and quantity of scholarly outputs. This keynote focus is showing the possibilities of how AI aids effective research. By combining traditional research methodologies with cutting-edge AI innovations, this session will equip scholars with the necessary skills to navigate the complexities of academic reading, writing and contribute meaningfully to their respective fields.

Invited Talk - XIII



Dr. Kandiah Shriganeshan
Professor in English Language Teaching
University of Jaffna
Sri Lanka

Biography: Dr. Kandiah Shriganeshan is a Professor in English Language Teaching at the University of Jaffna, Sri Lanka, with expertise in English Language Teaching, Literature, Translation Studies, Drama, Theatre, Tamil Studies, and Linguistics. He holds a Ph.D. in English from EFLU, Hyderabad (2009), an M.Phil. in Linguistics from the University of Jaffna (1999), and a B.A. (Hons.) in English, Linguistics, and Drama (1991). With extensive academic and administrative experience, Dr. Shriganeshan has served as Head of ELTU, Vavuniya Campus and coordinated various degree programs, including B.A. in ELT and Translation Studies. His teaching philosophy focuses on integrating theatre and literature into language learning to enhance communication skills. He has received multiple literary awards, including the SAARC Literature Award (2023) and the Godage National Literary Award (2020). His research contributions include publications in indexed journals, books on English language teaching through literature and theatre, and translations of South Asian literary works. Dr. Shriganeshan has delivered keynote and plenary addresses at international conferences and conducted workshops on English teaching through theatre. He has served as an editor and reviewer for research journals and is actively involved in curriculum development, faculty training, and community outreach programs. His dedication to education, research, and language teaching methodology makes him a distinguished scholar in the field of English Studies and Applied Linguistics.



ABSTRACT

Realizing the plurality and diversity of local traditions through the space created by the translations of literary texts in English

Kandiah Shriganeshan

Dept. of English Language Teaching
 University of Jaffna, Sri Lanka

Post-colonial literature is a new term for Commonwealth literature which could be divided into two major categories: Literature in English and Literature in other languages. Under Literature in English, there could be two major divisions, namely, English Literature by writers who are native speakers of English and Literature in English by non-native writers. Under the banner Literature in English, there could be two major divisions, namely, those originally written in English and those translated from other languages of diverse ethnicities into English. Critics have spoken of an innovative idiom to express native experience in English but intelligibility is a further problem faced by international readers. There are two factors that need to be considered. One is that native and traditional metaphors may not be able to express modern life. On the other hand, the range of experiences and problems faced by all natives could not be expressed by the English educated “elite”. As found in literary pieces from other commonwealth countries like India and Nigeria, Sri Lankan Tamil poetry in English, too deals with many a theme. The poets have raised their voice on themes like nature, love, nationalism, war, ethnic crisis, terrorism and the other problems like unemployment, poverty, alienation, personal grievances, and caste discrimination. There have been tension and differences of opinion among critics and linguists on the use of language, idiom, imagery and the themes used by the writers. The translations of literary texts have created a space for the new generations of readers to realize the plurality and diversity of local traditions. In addition to exposing our culture, traditions and our day to day problems to the international readership, it has become a medium through which one can understand the life of fellow countrymen speaking a different language. This paper makes an attempt to look into the possibilities of taking it as a blessing to express the voice of the people or a curse to lose the meaning and identity of the very same people.



Invited Talk - XIV



Dr. Mohammed Shamsul Hoque
 Professor and Former Head
 Department of English
 Daffodil International University,
 Bangladesh

Biography: Prof. Dr.

Mohammed Shamsul Hoque is a distinguished academic and former Head of the Department of English at Daffodil International University, Bangladesh. With a career spanning five decades, he has taught at various levels, including primary, secondary, undergraduate, and postgraduate education across multiple countries such as the UK, Bangladesh, Malaysia and Turkey.

He holds a Ph.D. in Communicative Language Teaching (CLT) from the University Sains Islam Malaysia (USIM) and has earned multiple prestigious qualifications, including a Cambridge CELTA, M.Ed. in TEFL from the University of Wales, and a PGC in Language and Literacy from the University of London.

Dr. Hoque has extensive research contributions, publishing around 40 research articles, including 27 Scopus-indexed papers. He has adjudicated Ph.D. and M.Phil. theses globally and has been a keynote speaker at numerous international conferences. He is actively involved in research networks in Malaysia, UAE, KSA, Indonesia, India, Denmark, Ireland, and Bangladesh.

Apart from academia, he has played a significant role in organizing international conferences and faculty development programs. He was the founding joint secretary of BELTA (Bangladesh English Language Teachers' Association) and has led major ELT and bilingual education conferences in Bangladesh and the UK.

His teaching philosophy emphasizes inclusive education, differentiated instruction, and participatory learning. His leadership skills, experience in faculty development, and commitment to academic excellence make him a valuable contributor to global education.

Talk on: Rights and Wrongs of Integration of AI into the Curricula: What Future Holds for Humanity



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MA-01

A Single Product Production Stochastic Inventory System with Heat Reduction and Retain Production Efficiency by Break

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Abstract: This Current Study Focusing on arriving Expected total cost of the stochastic production system in which the rate of deterioration is not allowed to rise over a period of time due to heat generation by imposing break to the performance of production unit. Initially the Production system starts producing items in an in-control state with no defective outlet and satisfies all previous backlogs first and continues for random time and turns into out-of-control state which results in some defective products. It is unavoidable that the prolonging time of the performance of the production unit accumulates heat which causes malfunctioning of the production system and results in more defective items in its outlet. A break is imposed in the period of Out-of-Control state which facilitates to stop the increase of defective items further till the stop of production after reaching the desired unit of items. Demands are started to satisfy once all backlogs are satisfied it continues after the stop of production. All demands after the stockout period are backlogged and satisfied immediately in the beginning of the very next inventory production cycle. The in-control state of the production system follows exponential distribution. An explicit expression for expected total cost is arrived and the numerical example is given to validate the model. Sensitive analysis focusing on the effect of break duration and control state of the production unit in arriving expected total cost.

Keywords: Production inventory, Defective products, Break in Production, Heat generation, Backlogs.



MA-02

Adjacent Vertex Reducible Edge Coloring of Cartesian Product Graphs

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Abstract: In graph theory, a graph $G = (V, E)$ is said to have an adjacent vertex reducible edge coloring if there exists a function $f: E(G) \rightarrow \{1, 2, 3, \dots, K\}$ such that for any two adjacent vertices u and v with the same degree, the sets $S(u)$ and $S(v)$ are equal, where $S(u) = \{f(uv), uv \in E(G)\}$. The maximum value of K is called chromatic number of adjacent vertex reducible edge coloring. This research aims to determine the chromatic number for adjacent vertex reducible edge coloring in cartesian product graphs.

Keywords: Edge coloring, cartesian product graphs, Avrec chromatic number.



Perfect Geodesic Intuitionistic Fuzzy Graph

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Abstract: The study defines pseudo geodesic sets in intuitionistic fuzzy networks as nodes that do not belong to any geodesic basis. The cardinality of this collection defines the graph's pseudo geodesic number. The study, perfect geodesic intuitionistic fuzzy graphs as intuitionistic fuzzy graphs with a pseudo geodesic number equal to zero. Examples of perfect geodesic intuitionistic fuzzy graphs are given. Furthermore, the research shows that full intuitionistic fuzzy graphs and intuitionistic fuzzy cycles fit into this category, meaning that every node in these graphs is part of at least one geodesic basis.

Keywords: Fuzzy graph, Intuitionistic fuzzy graph, Geodesic, Intuitionistic fuzzy cycle.



MA-06

Two Server Queueing Model with Server Vacations, Feedback and Balking

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Abstract: This paper analyses an M/M/2 queueing system with two heterogeneous servers, each possessing distinct functional attributes. Upon service completion, a server takes a single vacation if no customers are present in the system and transitions to a working vacation based on customer arrivals. The model incorporates customer feedback, offering insights into service satisfaction, and also considers balking behavior, where customers may choose to leave without service. The system is examined under the matrix geometric method. Performance measures are derived and graphical as well as numerical illustrations are presented to assess the model's efficiency.

Keywords: Working Vacation, Feedback, Balking, Two Servers, Matrix Geometric Method.



Numerical Investigation of MHD, Radiative Heat Flux and Activation Energy using Williamson Nanofluid in a Stretching Cylinder

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Abstract: The current study analyses the complex rheological characteristics of Williamson nanofluid and their consequent effects on the flow dynamics observed near a stretching cylinder embedded in a porous medium with the combination of magnetic field. This research holds significant promise for advancements in heat transfer, nanofluid technology, and manufacturing process optimization. In addition, the model incorporates a velocity slip boundary condition at the cylinder surface and accounts for viscous dissipation, radiative heat flux, heat source/sink and activation energy. The system of nonlinear PDEs is transformed into a system of ODEs via similarity transformation technique and then these transformed ODEs are tackled numerically and graphically utilizing a shooting technique followed by the bvp4c process. This study comprehensively examines heat and mass flux rates under varying physical parameters, revealing key trends and improves our knowledge of intricate fluid behaviours observed in stretching cylinder geometries.

Keywords: Williamson nanofluid, Stretching cylinder, Mixed convection, Permeable medium, Activation energy, Bvp4c method.



MA-08

Smart Solutions for Obesity: A Neutrosophic Fuzzy Approach to Weight Reduction Strategies in India Using - FUCOM-TOPSIS

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Abstract: This study focuses on selecting the most effective obesity and weight reduction strategies tailored to the Indian context by addressing key factors such as cost, healthcare acceptance, accessibility, and potential negative outcomes. Considering the inherent uncertainty and imprecision in evaluating complex health strategies, we employ the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) integrated with linguistic-neutrosophic fuzzy sets. This advanced methodological framework facilitates the simultaneous analysis of qualitative and quantitative data, capturing expert judgments and uncertainty. The proposed approach systematically ranks various strategies to identify the optimal solution. The results aim to provide actionable insights for policy-makers and healthcare professionals, ensuring that selected strategies are cost-effective, widely accepted, and accessible, with minimal adverse effects. This study offers a robust decision-support tool for addressing the pressing issue of obesity in India, fostering evidence-based and context-specific interventions.

Keywords: Obesity, Weight Reduction, TOPSIS, Neutrosophic Fuzzy Set, Linguistic Variables, Linguistic Neutrosophic Fuzzy Set.



MA-10

Neutrosophic Under Soft Generalized Continuous Functions: Foundations and Applications in Recruitment Analysis

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Abstract: Empirical Correlation System is an important tool that expresses the linear interrelations between two variables. Its significance lies in describing the obvious link without explicitly declaring the causality existing between the involved sets. This new framework presents an elaborate study of basic definitions and operations associated with Neutrosophic Under Soft Sets. Furthermore, the paper introduces a new notion: a topological space together with the Neutrosophic Under Soft Sets (N_u^o -sets). Additionally, Neutrosophic Under Soft Generalized Continuous Functions are introduced to extend the theoretical framework. These inclusions are expected to enable a deeper understanding and broader applications in the mathematical environment. The research not only establishes the foundational aspects of these concepts but also investigates several properties and theorems related to them. This is complemented by a variety of numerical illustrations to elucidate and enhance the understanding of the topics. To demonstrate the practical relevance of these ideas, the paper utilizes the correlation framework to present a numerical example of this relation in application.

Keywords: Neutrosophic Under Soft Set and Neutrosophic Under Soft Topological Space, Neutrosophic Under Soft Generalized Continuous Functions.



MA-11

GS_β Contra Continuity via Topological Grills

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Abstract: In this paper, a new concept of GS_β contra continuity using GS_β -open sets and θ -closed sets are proposed. Further, various properties of this function are investigated with the proper illustration. Further, the idea of GS_β contra continuous functions are compared with some other existing functions and some interruptions are interrelated with proper example. And also, composition of two GS_β contra continuous function need not be GS_β contra continuous function is also proved with the suitable interpretation. In addition, the novel approach of GS_β - T_1 and GS_β - T_2 space are proposed and some characterizations have been discussed with the proper examples. Many theorems are demonstrated and investigated. Furthermore, the interrelationship between GS_β continuous functions, GS_β contra continuous functions and contra semi continuous functions have been studied with proper example.

Keywords: GS_β Contra Continuity, GS_β -Open Sets, Topological Spaces, Contra Semi Continuous Functions, GS_β - T_1 and GS_β - T_2 Spaces.



MA-12

Comparative Analysis of Decision-Making Models using Matlab

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Abstract: Game theory serves as a conceptual framework for understanding social dynamics among competitive players. It facilitates both independent and interdependent analysis of situations. Decision-making processes under conditions of certainty, uncertainty, and risk, particularly in assignment problems, are integral across various industries. This paper introduces an alternative approach to address decision-making challenges stemming from uncertainty, certainty, and risk, offering novel methodologies for solving assignment problems. Additionally, game theory and decision-making strategies under varying conditions are applied to tackle prevalent issues. Various decision-making methodologies, including symmetric and non-symmetric approaches, are examined and contrasted with game theory. Furthermore, the efficiency of proposed methodologies is underscored through comparisons with classical solutions. The paper delves into convergence behavior to enhance decision-making under uncertainty and assignment problems. Finally, a novel approach is employed to derive optimal solutions, which are then validated using MATLAB. Graphical representations of results for both symmetric and non-symmetric problems are generated using MATLAB to enhance clarity.

Keywords: Game Theory, Decision-Making Under Uncertainty, Assignment Problems, Symmetric and Non-Symmetric Approaches, MATLAB Simulation and Analysis.



MA-13

A Cost Optimization Study on Managing Single Ameliorating and Deteriorating Inventory System with Pre Payment Option

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Abstract: Handling ameliorating inventory items and raising them for sale after it attains its maturity period is a challenging task in revenue generation process in supply chain management sectors. Works on ameliorating inventory system study in the past are not focusing much on partial payment options. This study project it to optimize the total cost of the system. The current study projects the effect of partial payment option with in the inventory cycle on ameliorating inventory management and selling of livestock. The objective of optimizing the total cost of under considered EGQ model is attained where the livestock items are subject to deteriorate while time progressed. Essential screening processes is initiated at the beginning of inventory cycle immediately after items got replenished. It eases the unnecessary cost expenses on caring and growing unworthy items. The model sequencing as follows: All fixed quantity young items are arrived to inventory and the feeding process starts for ameliorating them after screening and eliminating the weaker items. After all livestock reached desired maturity age, they are sold for revenue. Deterioration may happen throughout the cycle. Partial payment option is granted for the retailers from the supplier. It grants the retailer to pay a partial purchase cost in the initial time of the replenishment and the remaining partial payment will be made to the supplier upon their return to collect the defective items from their supply. Total cost of the system is analytically derived and optimized by gradient method. All parameters are sensed for its effectiveness with appropriate illustrations. Managerial insights are concluded.

Keywords: EGQ model, Partial Payment, Deterioration, Screening, Multi-Variable Optimization.



MA-17

Multi Criteria Decision Making by Applying Fuzzy TOPSIS Method to Diagnosis of Ovarian Cancer

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Abstract: Fuzzy set theory is a mathematical method for dealing with uncertainty and imprecision in decision-making. Some of the challenges and complexities involved in medical diagnosis can be addressed with the help of fuzzy set theory. Ovarian cancer is a disease that affects the female reproductive system's ovaries, which also make the hormones progesterone and estragon. The ovarian cancer stages demonstrate how far the disease has spread from the ovaries to other organs. This paper is to diagnosis of ovarian cancer using fuzzy TOPSIS (Technique for Order Preference by Similarity to Ideal Solution), because it can manage intricate decision-making processes with several criteria and uncertainties, the TOPSIS method is very useful in the diagnosis of ovarian cancer. Fuzzy TOPSIS provides a more accurate and reliable ranking of alternatives by considering the vagueness in the decision-making process. This project results in to be aware of the ovarian cancer.

Keywords: Intuitionistic fuzzy set, Fuzzy TOPSIS, Ovarian Cancer, Decision Making, Aggregation operators.



MA-18

Stochastic Switch-Based Markovian Queueing System with Slow Phase Behaviour

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Abstract: This paper examines a Markovian single-server queueing system functioning within a dynamic random environment that transitions across N levels, regulated by a stochastic switch. The switch is responsible for allocating jobs to the server. If the server experiences a breakdown at any of the N levels, it moves into a slow phase, where it completes the service of customers already in the system. Once all customers are served, the server immediately reports back to the stochastic switch to receive a new service job. The stochastic switch initiates a setup time and remains idle until a customer arrives, at which point it assigns a job to the server in one of the N levels with a positive probability determined by a binomial distribution. During the slow phase, the server operates at a reduced service rate, and new customers are not allowed to enter the system. After serving the last customer in either the random environment or slow phase, the server transitions back to the stochastic switch state. The study presents expressions for the time-dependent state probabilities and key performance features of the system.

Key words: Markovian Single server, Random Environment, Server Breakdown, Stochastic switch.



Exploring Domination in Strongly Connected Product Fuzzy Digraphs

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Abstract: Network optimization is essential to contemporary communication systems and seeks to improve network performance, reliability, and efficiency. In this paper, we have introduced the domination number of the Strongly Connected Fuzzy Digraph (*SCFD*) with certain bounds. Further, we extend our study to introduce the product operations of the maximal and co-normal product of *SCFD* and establish the properties of these operations using Strongly Connected Product Fuzzy Digraph (*SCPFD*). We analyze the efficiency of the maximal and co-normal products of *SCPFD* using the domination number, minimal arborescence, and burning number. An algorithm has been developed to find the efficiency of the maximal and co-normal products of *SCPFD*. The applications of this research aim to identify the emergency healthcare optimization response network, which is crucial for emergency medical services to respond swiftly and efficiently to handle medical emergencies in metropolitan areas. Further, we focus on identifying essential dominating nodes, a minimal arborescence, and the burning number, thereby improving the emergency response network's overall functionality, resilience, and effectiveness.

Keywords: Strongly connected fuzzy digraph, Domination number, Arborescence weight, Burning number



MA-20

A Study on Fuzzy Partial Metric Spaces

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Abstract: Partial metrics constitute a generalization of classical metrics for which self-distance may not be zero. It was introduced by S.G. Matthews in 1994 in order to provide an adequate mathematical framework for the denotational semantics of programming languages. Since then, different works were devoted to obtaining counterparts of metric fixed-point results in the more general context of partial metrics. Nevertheless, in the literature was shown that many of these generalizations are actually obtained as a corollary of their aforementioned classical counterparts. Recently, two fuzzy versions of partial metrics have been introduced in the literature. Such notions may constitute a future framework to extend already established fuzzy metric fixed point results to the partial metric context. To achieve this goal, we construct a fuzzy metric from a fuzzy partial metric. The topology, Cauchy sequences, and completeness associated with this fuzzy metric are studied, and their relationships with the same notions associated to the fuzzy partial metric are provided. Moreover, this fuzzy metric helps us to show that many fixed-point results stated in fuzzy metric spaces can be extended directly to the fuzzy partial metric framework.

Keywords: Partial Metrics, Fuzzy Partial Metrics, Fixed Point Theory, Denotational Semantics, Cauchy Sequences and Completeness



LEHMER – 3 Mean Labeling of Subdivision Graphs

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Abstract: A graph G with p vertices and q edges is called Lehmer - 3 mean graph if it is possible to label the vertices $x \in V$ with distinct labels $g(x)$ from $1, 2, \dots, q + 1$ in such a way that when each edge $e = uv$ is labeled with $g(e = uv) = \left\lfloor \frac{g(u)^3 + g(v)^3}{g(u)^2 + g(v)^2} \right\rfloor$ or $\left\lceil \frac{g(u)^3 + g(v)^3}{g(u)^2 + g(v)^2} \right\rceil$, then the resulting edge labels are distinct. In this case g is called a Lehmer – 3 mean labeling of G . In this paper we prove that subdivision related graphs such as $(C_\alpha @ P_\beta) \odot \bar{K}_1, (C_\alpha @ P_\beta) \odot \bar{K}_2, (C_\alpha @ P_\beta) \odot \bar{K}_3, (C_\alpha @ P_\beta) \odot K_2$, Subdivision of $(S(C_\alpha @ P_\beta)) \odot \bar{K}_1, (S(C_\alpha @ P_\beta)) \odot \bar{K}_2, (S(C_\alpha @ P_\beta)) \odot \bar{K}_3, (S(C_\alpha @ P_\beta)) \odot K_2, S((C_\alpha @ P_\beta) \odot \bar{K}_1)$ and $S((C_\alpha @ P_\beta) \odot \bar{K}_2)$ are all Lehmer – 3 mean graphs.

Keywords: Graph, Lehmer – 3 Mean Labeling, Corona Product of G , Subdivision of G , Dragon Graph.

Secure Communication and Management of IoT Devices in Smart Healthcare Using Pentagonal Fuzzy Numbers and Cryptographic Network Security Systems

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Abstract: In the rapidly developing field of smart healthcare technology, maintaining the integrity of IoT devices is crucial to security. Despite their effectiveness, standard cryptographic techniques operate in a systematic rapid manner that is frequently too rigid to handle the inherent uncertainties or fluctuations of an IoT environment. We investigated a novel paradigm for applying pentagonal fuzzy numbers (PFNs) combined with cryptographic network security techniques to address this issue and improve the security and reliability of smart healthcare IoT devices. We have a strong framework for key management that is comparable to secure communication and dynamic authentication by utilising the fuzziness and dynamism of PFNs. Our approach consists of deploying the fuzzy keys generated from PFNs to IoT devices, using device authentication, establishing secure encrypted communication in a fuzzy range. Through a variety of realistic modelling elucidations and a feature-wise systematic implementation plan, we have demonstrated how the integration of PFNs with cryptographic techniques can, in fact, improve the security framework of smart healthcare and make the safety from cyber threats more rigid while maintaining the operational and user-friendliness aspects proportionate.

Keywords: RSA Algorithm, Pentagonal fuzzy number, Chinese remainder theorem, IoT Devices

MA-25

Mathematical Modeling and Analysis of Diabetic Foot Ulcer Dynamics Using Differential Equation Techniques

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Abstract: In the globe one of the silent killer diseases of epidemics, representing a developing danger to general wellbeing is foot ulcer of diabetic. Nearly 25% of diabetic patients happened open sore or ulcer related diseases, and is usually situated on the lower part of the foot. Of the people who foster ulcer of a foot, approximately 6% of diabetic patients will be admitted in hospital because of disease or related to ulcer entanglement. From this paper centers around a modelling through mathematically known as the foot ulcer model of diabetics. The foot ulcer of diabetic related to model is investigated utilizing differential equation techniques to screen the diabetic populace over the long run. Additionally, we examine the foot ulcer of diabetes model mathematically and find the boundedness of positivity, the basic reproduction number, equilibrium points of disease free and endemic were determined and their qualities of stabilities were likewise resolved utilizing next generation method of matrix method.

Keywords: Diabetic foot ulcer [DFU], reproduction number, modelling, equilibrium, boundedness.



Enhancing Cloud Service Reliability and User Satisfaction through Two Stage Tandem Queues with N-Policy, Server Breakdown, Feedback and Reneging

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Abstract: This research delves into the realm of cloud services, proposing a novel approach to elevating reliability and user satisfaction through the implementation of tandem queues with reneging and breakdown, resilience. In the dynamic landscape of cloud computing, where service interruptions and varying workloads are commonplace, ensuring a consistently reliable and satisfying user experience is paramount. The proposed system employs tandem queues to strategically manage incoming service requests, minimizing user reneging and maximizing service reliability. In the ever-evolving landscape of cloud services, ensuring both reliability and user satisfaction is imperative. The proposed model addresses the challenges posed by dynamic workloads, unforeseen disruptions, and user expectations, providing a comprehensive framework for optimizing cloud service performance. The tandem queue system strategically manages incoming service requests, minimizing user reneging through intelligent queue dynamics. Simultaneously, breakthrough resilience mechanisms fortify the system against potential disruptions, ensuring uninterrupted service delivery. Through a series of comprehensive experiments and analyses, the study demonstrates the effectiveness of the presented model in improving overall cloud service reliability and user satisfaction. In this proposed model, we derive a steady state probability, the average number of customers, using the standard birth death process. In order to validate the analytical approach, we compute numerical results.

Keywords: Cloud Service Reliability, Tandem Queues, Reneging and Breakdown, Resilience Mechanisms, Performance Optimization.



MA-27

Analysing the Behaviour of Set of all Associated Prime of Ring 'A' in some Special Cases

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Abstract: Let \mathbb{R} Be A Ring. A Prime Ideal Belongs P To $\text{Spec}(\mathbb{R})$ Is Said To Be An Associated Prime If There Exist 'x' Belonging To \mathbb{R} Such That $x \neq 0$ and $\text{Ann}(x) = P$. We Are Going To Investigate The behaviour Of The Set Of All Associated Prime Of \mathbb{R} In Some Special Cases. We Will Assume A Cohen- Macaulay Local Ring (A, m) And A Finitely Generated Module 'M' Over A . A Well Known Result Of Brodmann States That The Set Of All Associated Prime Of M/IM As A-module Stabilize For Sufficiently Large 'n'. Let B Be a Ring Extension of A. We Will investigate the Behaviour of $\text{Ass}(M/i^n m)$ For Some Ideal I Of A And For $n \gg 0$.

Keywords: Associated Prime Ideal, Cohen-Macaulay, Local Ring.

Mathematical Modeling and Control Strategies for Monkey-pox and Co-Infection Dynamics Using a Seven-Compartment Framework

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Abstract: In this paper, we develop a mathematical model to study the dynamics of monkey-pox and co-infection with another virus in a population using a seven-compartment model. The model incorporates susceptible, exposed, infected with monkey-pox, infected with the co-infecting virus, co-infected individuals, recovered individuals, and vaccinated individuals. Key analytical results include the derivation of the basic reproduction number (R_0), stability analysis, and conditions for disease eradication. Numerical simulations demonstrate the potential effectiveness of vaccination and other control strategies. These findings provide critical insights into managing co-infection scenarios involving monkey-pox and similar diseases.

Keywords: Monkeypox Dynamics, Co-Infection Model, Basic Reproduction Number, Stability Analysis, Vaccination and Control Strategies.



MA-29

Integrated FWZIC - RAFSI approach based on Intuitionistic fuzzy knowledge with application in Early lung cancer screening

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Abstract: As the economy develops and living standards improve, health has become a top priority for many. Lung cancer, one of the most severe and life-threatening diseases, poses a significant health risk due to its high mortality rate and low survival rate, mainly because early symptoms are often subtle or undetectable. By the time a diagnosis is made, many patients are already in the middle or advanced stages of the disease. Therefore, early lung cancer screening is essential for more effective treatment and better outcomes. The screening process itself can be approached as a multi-criteria decision-making challenge, requiring the careful evaluation of numerous factors to ensure precise detection and diagnosis. Intuitionistic Fuzzy Set is a powerful tool to deal with uncertain and ambiguous information and has better applicability in quantifying such information. The proposed hybrid approach is evaluated against standard lung cancer screening methods using publicly available datasets, demonstrating superior performance in terms of sensitivity, specificity, and overall accuracy. The results show that the integration of FWZIC, RAFSI, and IFS provides a promising framework for early lung cancer detection, offering clinicians a reliable tool for making accurate diagnoses.

Key words: Intuitionistic Fuzzy Set (IFS), FWZIC, RAFSI, Lung cancer screening



MA-30

A Variable Stepsize Block Backward Differentiation Formula for Solving Stiff Ordinary Differential Equations

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Abstract: This paper presents a variable stepsize Block Backward Differentiation Formula (BBDF) method for solving first-order ordinary differential equations (ODEs). Traditional fixed-step size methods often struggle to efficiently handle stiff and non-stiff ODEs due to their inability to adapt to the local behavior of the solution. The proposed method extends the classical BBDF approach by incorporating an adaptive stepsize strategy, which dynamically adjusts the step size based on local error estimates and solution behavior. This enhancement improves computational efficiency and accuracy, particularly for problems with rapidly varying solutions or regions of stiffness. The variable stepsize BBDF method is derived, and its stability and convergence properties are analyzed. The results highlight the method's robustness and versatility, making it a promising tool for solving a wide class of differential equations.

Keywords: Variable Stepsize Methods, Block Backward Differentiation Formula (BBDF), Ordinary Differential Equations (ODEs), Stiff and Non-Stiff Problems, Stability and Convergence Analysis.



MA-31

Fuzzy Neutrosophic Travelling Salesman Problem

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Abstract: The Travelling Salesman Problem is a classic combinatorial optimization problem that seeks the shortest possible route for a salesman to visit a set of cities and return to the starting point. In real-world scenarios, uncertainties and vagueness exist in parameters such as travel costs, distances, and time constraints. To address these uncertainties, this study introduces the Fuzzy Neutrosophic Travelling Salesman Problem, which integrates fuzzy logic and neutrosophic sets to model imprecise and indeterminate information effectively. In this study, we formulate the FN-TSP using neutrosophic numbers and propose an optimization algorithm to find an efficient route while considering uncertainty and hesitation degrees. Various heuristic and metaheuristic techniques, such as genetic algorithms, particle swarm optimization, and ant colony optimization, are adapted for solving the FN-TSP. Experimental results demonstrate the effectiveness of the proposed model in handling real-world uncertainties and improving decision-making under imprecise conditions. The FN-TSP model has potential applications in logistics, supply chain management, and transportation networks, where uncertainty plays a critical role in route planning.

Keywords: Travelling Salesman Problem (TSP), Fuzzy Neutrosophic Sets, Uncertainty, Optimization, Metaheuristic Algorithms.



MA-32

Analysis of Total Inventory Cost for Deteriorating Product with Delay Payment Scheme

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Abstract: In this paper, we discuss the Economic Order Quantity (EOQ) model under permissible payment delays, focusing on inventory management for deteriorating products with backorder shortages. Many researchers have focused on the credit trade period and presented various results. This paper mainly focuses on the credit period along with interest rate classifications. Based on this, we propose an algorithm that incorporates trade credit in the context of supply chain management, where vendors offer payment delays to optimize inventory control. The model integrates trade credit and inventory management strategies to determine the optimal order quantity. The objective of this paper is to find the optimal EOQ that minimizes total costs while accounting for the payment delay provided by the vendor. A numerical example is included.

Keywords: Integrated Inventory Model; Deteriorating Product; Demand, Order Quantity; Trade Credit Off.

A Stochastic Inventory Systems with Integrated Re-Do Facilities and Compulsory Waiting Periods

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Abstract: This study presents a stochastic inventory model for a single product incorporating integrated re-do facilities and a compulsory waiting period (CWP). In addition to regular replenishment up to a maximum capacity of S units, the retailer acquires q ($q < S$) minor defective items from the supplier. These items undergo a re-do process, allowing the retailer to restore and sell them at the original price, similar to non-defective items. The inventory consists of non-perishable items, and due to supply constraints, the supplier enforces a CWP immediately after each replenishment, lasting a random duration modeled by an exponential distribution. An instantaneous replenishment policy is applied when the inventory depletes, provided that the CWP is not in effect. However, if the inventory reaches zero during the CWP, the system must wait until the restriction period ends before restocking. The demand follows a Poisson process, while the re-do item arrivals to the inventory adhere to an exponential distribution. The system is analyzed using a Markov framework, with state probabilities evaluated in the steady state. Numerical illustrations validate the model under different operational settings. Key performance metrics, such as the mean number of items in re-do processing and the mean number of restored items added to inventory, are analyzed. These insights are crucial for retailers in competitive markets, enabling informed decision-making and strategic planning to optimize inventory management.

Keywords: Compulsory Waiting Period, Perishability, Instantaneous Replenishment, Re-do process, Adjustable reorder policy.

A study of Subject Allocation to faculties in Universities using Quadratic Assignment Problem approach

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Abstract: The Quadratic Assignment Problem (QAP) is a well-known optimization problem that deals with the assignment of a set of facilities to an equal number of locations while minimizing the overall cost, based on pairwise distance and flow data. Traditionally applied in fields such as facility layout and scheduling, QAP provides a structured approach to solving complex allocation problems. This paper presents an innovative study that models the subject allocation process in educational institutions as a QAP, ensuring an efficient and balanced assignment of subjects to faculty members. First, we establish the required flow and distance matrices by incorporating faculty experience and the prerequisite dependencies among subjects. Then, we apply heuristic methods to solve the formulated problem and derive an optimal assignment that enhances the overall teaching efficiency and academic effectiveness. The proposed approach aims to provide a systematic and optimized framework for subject allocation, offering valuable insights into resource management in educational institutions.

Keywords: Assignment, Subject allocation, Greedy algorithm, optimization.



An Analysis on Fuzzy Inventory Control using different Fuzzy Numbers

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Abstract: Inventory management plays a crucial role in optimizing supply chain operations and minimizing costs in real-world industries. In this study, fuzzy inventory control is implemented to enhance decision-making under uncertain demand and supply conditions. The Economic Order Quantity (EOQ) and Total Cost formulae using Trapezoidal, Hexagonal, and Octagonal fuzzy numbers are derived incorporating their mathematical operations to handle imprecise data effectively. By comparing the solutions obtained from these different fuzzy approaches, the optimal inventory strategy that yields the minimum cost is obtained. The proposed model is particularly useful in industries such as retail industry, manufacturing industry, and logistics, where demand fluctuations and uncertainty significantly impact inventory decisions. The results demonstrate the effectiveness of fuzzy-based inventory management in achieving cost efficiency and better decision-making in uncertain environments. Furthermore, the comparative analysis of different fuzzy number techniques provides deeper insights into selecting the most suitable approach for inventory optimization. This study highlights the practical applicability of fuzzy logic in real-world scenarios, where precise data is often unavailable. A numerical example is illustrated to analyse the inventory model by applying three different fuzzy numbers. The findings can help businesses improve resource allocation, reduce waste, and enhance overall supply chain efficiency.

Keywords: Fuzzy optimization, Fuzzy Inventory Control Problem, Defuzzification Technique, Trapezoidal fuzzy numbers, Hexagonal fuzzy numbers, Octagonal fuzzy numbers.



MA-36

Queueing Analysis of Bulk Service Systems with Two Fluctuating Modes, Rework and Multiple Vacations

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Abstract: A queueing system featuring batch arrivals, which operates under two fluctuating service modes with different service rates, is analysed for its behaviour while a single operator dispatches sheet metal pieces. After completing a service mode, the sheet metal pieces may either require rework of the same mode without rejoining the end of the queue or exit the system. The operator enters a random-length vacation when queue length drops below threshold 'a' after successful service completion. The operator will maintain its consecutive vacation state until 'a' sheet metal piece remains in the queue upon returning. Through the supplementary variable technique, we can determine the steady-state probability generating function, which describes the system size during arbitrary times. A cost model and key performance measures are simultaneously developed along with the analysis. Numerical illustrations demonstrate how system parameters affect the results.

Keywords: Bulk service, Two fluctuating modes, Rework, Supplementary variable technique



MA-37

An Analysis of a Batch Arrival Bulk Service Queueing System with Low-Batch Service and Two Types of Multiple Vacations

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Abstract: This study examines a batch arrival bulk service queueing system with low-batch service and two types of multiple vacations. On completion of services, if the queue length is zero, the server performs type one vacation, repeatedly, until the queue length reaches 'a'. On returning from a type one vacation, if the queue length is at least 'a', the server performs another type two vacation, repeatedly, until the queue length reaches the threshold value N (where $N \geq b > a$). Once the threshold has been reached, a batch of 'b' customers is served. This method has numerous applications in the manufacturing and production industries. Performance measures, stability criteria, and a cost model are examined, with numerical illustrations to validate the findings.

Keywords: Bulk service, Low-batch service, and Multiple vacations.



MA-38

Server breakdown dependent renovation in bulk queueing system with vacation

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Abstract: In this paper bulk arrival and batch service queueing model with renovation of service station processed in two types one without service next with slow service and vacation are considered. Customers are arriving into the system in bulk according to Poisson process. Server provides service in batches according to general bulk service rule with minimum batch size α and maximum batch size β according to general bulk service rule. In this model we assume that though the server got breakdown service process will not be interrupted, it will be continued for current batch of customers by doing some methodological safeguard procedures. The server will be undergone with renovation works either with slow service or no service depending upon the nature of server failure. After service completion if the server got breakdown with probability p and if it is of type 1 then it will be sent to renovation of service station without service. On the other hand, if the server got breakdown of type 2 then the server provides service in lower service rate. After slow service completion, if customers require additional service as feedback, then they will be sent head of the queue and taken for service immediately. After service completion (either regular service or slow service) or renovation if the queue length is less than α then the server will be assigned to do some secondary work(vacation). After vacation completion if the queue length reaches the value α then the regular batch service will be started. On contrary if the queue length is still less than α even after vacation completion then the server remains idle (Dormant period) until queue length reaches the value α . For the proposed queueing model probability generating function of the queue size at an arbitrary time will be obtained by using supplementary variable technique. Various performance measures are also derived with suitable numerical illustration.

Keywords: Server breakdown dependent renovation, supplementary variable technique, Feedback, Renovation, Bulk arrival, batch service.

The schematic representation of proposed model is given below.

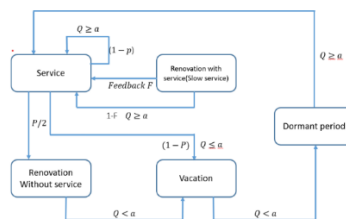


Fig 1. Schematic representation of proposed model.

MA-39

On Solving Cubic Diophantine Equation $x^3 + y^3 = 24zw^2$

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Abstract: The ternary homogenous quadratic Diophantine equation representing cone given by $x^3 + y^3 = 24zw^2$ is analyzed for finding its non-zero distinct integral solutions. Seven different patterns of integer solutions are presented. A few interesting relations between the solutions and special number patterns are given. The theory of Diophantine equation offers a rich variety of fascinating problems. The ternary cubic Diophantine equation given by $x^3 + y^3 = 24zw^2$ was analyzed for its patterns of non-zero distinct integral solutions. Objectives: The objective of this paper is to explore the integral solutions of cubic Diophantine equation given by $x^3 + y^3 = 24zw^2$ by using suitable methodologies. A few interesting relations between the solutions and special numbers are exhibited. Method: Solving Diophantine equation is obtained by the method of Decomposition. The structure of decomposition: $f(u_1, u_2, u_3, \dots, u_n) = 0$ like $f_1(u_1, u_2, u_3, \dots, u_n), f_2(u_1, u_2, u_3, \dots, u_n), \dots, f_k(u_1, u_2, u_3, \dots, u_n) = a$, where $f_1, f_2, \dots, f_k \in \mathbb{Z}[u_1, u_2, \dots, u_n]$ and $a \in \mathbb{Z}$. By the decomposing method in primary terms of a , we achieve a countable number of decompositions in k full factors a_1, a_2, \dots, a_k . Each decomposition of this kind leads to a system of equations similar to: $f_1(u_1, u_2, \dots, u_n) = a_1, \dots, f_n(u_1, u_2, \dots, u_n) = a_n$. We get multitude of solutions for a given equation, by determining the system of equations. Findings: By the method of linear transformations, the ternary cubic equation with four unknowns is solved for its integral solutions. The equation is researched for its attributes and correlation among the solutions for its nonzero unique integer points. In each of the transformations taken, the cubic equation yields different solutions. The properties of the solutions and their relationship with the special numbers are also exhibited. Novelty: Mathematician's interest towards solving Pell's equation has been so much not because they approximate with a value for $t - \sqrt{t}$. The main importance of the Pell's equation is due to that most of the common questions have answers in this equation which can be sorted by 2 variables in the Quadratic equations. This document is about the research on higher degree Cubic Diophantine equation which gives the integral solutions of this equation, taken into consideration.

Keywords: Ternary Cubic Diophantine Equation, Integral Solutions, Decomposition Method, Linear Transformations, Special Number Patterns.



Analysis of Cognitive Radio Wireless Networks with Underlay Transmission and alpha-Retry Policy

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Abstract: We consider cognitive radio wireless networks with multi-channel system capable of serving two types of transmission packet, Primary Users (PU) and Secondary Users (SU). If the PU finds an idle channel, then starts to transmission immediately. If the channel is occupied by other PUs, the newly arriving PU leaves the system. In case the channel used by SUs, the ongoing SU is interrupted and the PU occupies the channel, The PU finishes the transmission and leaves the system. The arriving SU starts to sense channels. When the SU finishes sensing and finds an idle channel, the SU starts transmitting. If the SU finishes sensing and cannot find idle channels, it senses again after a random time period. Upon arrival of a PU, the interrupted SU either returns back to the sensing pool again or balks immediately. The matrix analysis method (MAM) is widely adopted to study the steady-state performance of cognitive radio systems under various assumptions. The results of the analysis are validated and illustrated numerically.

Keywords: Cognitive Radio Wireless Networks, Spectrum Access, Queueing System, Matrix Analytic Method (MAM).



MA-41

Impact of Server Deterioration and Recovery on a Multi-Server Retrial Queue with Collisions

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Abstract: In this paper consider a retrial queue with collision, server deterioration and recovery. Two parallel servers handle arriving customers, when both servers are busy, arriving customers sent to the orbit. Collisions occur when a customer retries from the orbit but finds a server already occupied, causing both the retrying customer and the customer being service to be pushed into the retrial orbit. The first server operates normally, while the second server experiences deterioration, meaning its service declines due to factors like fatigue or wear. After completing a certain number of services, the second server loses energy or takes a break, temporarily leaving the system for recovery before resuming service. The system is analyzed in the steady state using matrix analytic method, obtain the stationary probability distribution and key performance measures. Furthermore, the conditional stochastic decomposition for the queue length in the orbit is derived. Finally, provide numerical illustrate the impact of system parameters on performance.

Keywords: Multi server, Retrial, Deterioration and recovery, Collisions.



MA-42

Dynamic Routing Strategies for Reverse Logistic Network with Transit Time Minimization

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Abstract: This paper investigates a dynamic path flow system within a closed-loop architecture specifically designed for logistics supply chain management. In this context, we propose a new algorithm to minimize inventory transportation time and an Integrated Forward Reverse Logistics Network (IFRLN) to enhance supply chain efficiency. The aim of the proposed model is to systematically prioritize demand and ensure that it is dynamically allocated to the most relevant and appropriate locations. The mathematical computation required to solve this complex problem is classified as NP (Non-Polynomial) hard, making it computationally challenging. To address this issue effectively, a memetic algorithm is employed as a solution strategy, significantly contributing to reducing inventory transit time and improving operational efficiency. A numerical example is included.

Key words: Forward / reverse logistics techniques, Dynamic path, Computational algorithm Supply chain management, Transportation time.



Fuzzy secure double resolving set, Fuzzy secure double resolving domination in Fuzzy graph

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Abstract: A subset S of Fuzzy Graph $H(V, \alpha, \beta)$ is said to be a fuzzy secure double resolving set of H if S be a fuzzy double resolving set, each p in $V(H) - S$ there exists r in S such that $(S - \{r\}) \cup \{p\}$ is fuzzy double resolving set. Here we discuss fuzzy Secure Resolving Domination Number for Some Well-known fuzzy Graphs, some properties, Corollary, results, and theorems of fuzzy secure doubly resolving sets fuzzy cosecure double resolving set, fuzzy secure double resolving domination and fuzzy double cosecure resolving domination in fuzzy graph and also discussed real life Application of Fuzzy secure double resolving set.

Keywords: fuzzy graph, fuzzy double-resolving set, fuzzy doubly resolving number, fuzzy secure resolving, fuzzy secure resolving domination.



MA-44

Fuzzy Locating Set

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Abstract: In this paper, we introduce the concepts of locating code in graph Theory into fuzzy Graph. Let $G (V, \sigma, \mu)$ be a connected fuzzy Graph. For an ordered fuzzy subset $S\{\sigma_1, \sigma_2, , \dots, \sigma_m\} \subseteq \sigma(G)$, $|S| \geq 1$ where $\sigma_1 = (v_1, \sigma(v_1))$, and for a fuzzy graph with at least $n \geq 2$ vertices, the code $c_s(\sigma_i)$ of a fuzzy graph $\sigma = \{\sigma_1, \sigma_2, , \dots, \sigma_n\} \in \sigma(G)$ with respect to S is an ordered K -tuple $\omega(\sigma_i, S)$ that represents the weight of the connectedness between two different vertices. The Fuzzy subset S is called a Fuzzy locating set of G , if each $c_s(\sigma_i)$ has a distinct representation with respect to S . A fuzzy locating set of the minimum cardinality is the fuzzy locating number of G denoted as $F_{ln}(G)$.

Keywords: Fuzzy Locating set, Fuzzy locating number, strength of connectedness, Connected Matrix



A Study on Tripolar Complex Subalgebras of Lie Algebras

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Abstract: This paper introduces the concept of tripolar complex fuzzy subalgebras and Lie ideals within the framework of Lie algebras. A tripolar complex fuzzy set is an extension of bipolar fuzzy sets, characterized by three membership degrees to manage more intricate uncertainties. The study systematically develops the theory of tripolar complex fuzzy subalgebras, with a focus on solvable and nilpotent tripolar complex fuzzy Lie ideals. Fundamental properties of these ideals are explored, along with their interactions and structural implications within Lie algebras. Relationships between tripolar, bipolar, and classical fuzzy structures are established, providing a comprehensive understanding of their roles in Lie algebraic contexts. This work extends the landscape of fuzzy algebraic structures and offers new perspectives on solvability and nilpotency in fuzzy settings.

Keywords: Fuzzy set, Bipolar fuzzy set, Tripolar complex fuzzy set, Bracket product and Solvable and nilpotent Lie ideals.



Exploring Complex Intuitionistic Fuzzy Positive Implicative Ideals in BCK-Algebras

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Abstract. This study explores complex intuitionistic fuzzy sets within the framework of BCK/BCI-algebras. We define and analyse complex intuitionistic fuzzy subalgebras and complex intuitionistic fuzzy ideals, including positive implicative ideals and BCI-positive implicative ideals. Through detailed characterizations based on CIFs and their algebraic properties, this research advances fuzzy algebra by integrating CIFs theory with operations in BCK/BCI-algebras, providing theoretical tools for modelling and reasoning in systems characterized by uncertainty and vagueness.

Keywords: BCK-algebra, complex intuitionistic fuzzy set, complex intuitionistic fuzzy ideal (positive implicative, BCI-positive implicative).



MA-47

A Survey on Retrial Queueing Model with Tandem Nodes, Optional Service, Unreliable Server, Feedback and Vacation

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Abstract: In this proposed work, we consider a Markovian model of two-stage tandem queueing system with retrial policy and server vacation with optional service, unreliable server and feedback. The arriving customers are directed to the first station for service if server is idle upon arrival. Otherwise, they will enter into the orbit for retrial. These customers will generate a continuous stream of request for service in a random period of time. After completing the first station service, the customers will enter into the second station. Once the customers receive their service in both stations, they either depart from the system or may seek the Optional Service (OS) and then leave the system. It is mandatory for all the arriving customers to come across both the service stations and it is optional to enter optional service. In the event of unforeseen circumstances, the server may encounter a breakdown, at which point an immediate repair process will be initiated. After the service completion, the customer may leave the system or rejoin the orbit if not satisfied and demand regular service as feedback. When no more customers are present in the orbit, the servers will leave for vacation. The balance equations of birth–death transitions are solved using the recursive approach. Various system performance measures are derived.

Keywords: Two-stage tandem queue, Retrial policy, Optional service, Feedback, Unreliable server, Vacation.



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Novel Synthesis of Chitosan Based WO₃/ Mxene Nanocomposites for Asymmetric Supercapacitor

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Abstract: This study explores the synthesis and characterization of chitosan-based WO₃/MXene nanocomposites for application in asymmetric supercapacitors (ASCs). The incorporation of WO₃ (tungsten trioxide) and M Xene (a family of two-dimensional transition metal carbides/nitrides) into a chitosan matrix aims to combine the high electrochemical stability of M Xene with the pseudocapacitive behavior of WO₃, offering a synergistic effect to enhance the energy storage performance. The WO₃/M Xene/chitosan nanocomposite is fabricated using a simple, cost-effective method and characterized by various techniques including X-ray diffraction (XRD), scanning electron microscopy (SEM), and electrochemical impedance spectroscopy (EIS). The nanocomposite demonstrates an improved specific capacitance, excellent cycling stability, and high-rate capability compared to individual components. The hybrid structure is tested in an asymmetric supercapacitor configuration, showing superior charge-discharge efficiency and enhanced energy density. This work presents a promising strategy for developing high-performance, cost-effective supercapacitors with improved electrochemical properties, paving the way for more efficient energy storage devices.

Key Words: hybrid structure, supercapacitors.



Photo absorption, luminescence, chromaticity and catalytic properties of undoped CuO and Gd-doped CuO nanostructures for waste water treatment and LED devices applications

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Abstract: Co-precipitation synthesis of undoped and different concentrations of Gd-doping in the CuO material as a photocatalyst and methylene blue dye under passing solar light radiation is the primary goal of this investigation. This is followed by determining their photocatalytic degradation efficiency, which ranges from 88 to 96%. Creating a chromaticity diagram to determine the color coordinates in order to examine the uses of light-emitting devices using photoluminescence (PL) data of synthesized undoped and 1%, 3%, and 5 weight percent Gd-doped CuO. To use XRD and FT-IR analyses to track the vibrational bond, associated crystal structure, and diffraction peaks of undoped and Gd-doped CuO materials. SEM studies have shown that the morphological structure varies with each concentration of Gd-dopant when compared to undoped CuO nanostructures. UV-visible and PL spectra reveal that the aforementioned material has a narrow band gap and strong visible emission.

Keywords: Semiconductors; Structural; Optical properties; Luminescence; Photocatalysis

Enhanced Interpretation of Geoelectrical Resistivity Data Using Wavelet Transform and Principal Component Analysis: A Case Study in Minjur, Chennai

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Abstract: Understanding the subsurface features of the Earth is crucial for hydrogeological, environmental, and geotechnical investigations. This study employs a combined Wavelet Transform (WT) and Principal Component Analysis (PCA) approach to interpret geoelectrical resistivity data, enhancing the accuracy of subsurface characterization in Minjur, Chennai. The geoelectrical resistivity method, particularly the Vertical Electrical Sounding (VES) technique, is widely used for subsurface exploration. However, conventional interpretation methods often fail to effectively differentiate subtle variations in the resistivity structure due to noise and overlapping features. To overcome these limitations, this study integrates Wavelet Transform for multi-scale analysis of resistivity data, enabling the decomposition of signals into different frequency components. This helps in identifying anomalous zones and distinguishing lithological boundaries more effectively. Furthermore, Principal Component Analysis (PCA) is applied to extract dominant patterns from the resistivity dataset, reducing redundancy and improving the interpretability of subsurface variations. The combination of WT and PCA allows for the identification of key resistivity anomalies associated with aquifer zones, clay layers, and potential contamination sites. The study area, Minjur, Chennai, is a critical groundwater recharge zone experiencing increasing pressure due to urbanization and industrialization. The analysis reveals significant resistivity contrasts corresponding to shallow alluvial formations, deeper fractured zones, and saline water intrusion. The results indicate that integrating WT-PCA enhances feature extraction, making it a robust tool for subsurface characterization. The proposed methodology improves the resolution of geoelectrical data interpretation, offering insights that can aid in groundwater management and land-use planning. This study demonstrates that the synergy between Wavelet Transform and PCA significantly refines resistivity-based interpretations, making it an effective approach for geophysical applications in complex geological settings. Future research can extend this method to other geophysical datasets for improved subsurface modeling.



Keywords: Geoelectrical Resistivity, Wavelet Transform, Principal Component Analysis, Subsurface Characterization, Minjur, Chennai.

PH -04

Antimicrobial analysis of Bismuth doped Cobalt Oxide / Zirconium Oxide nanocomposite against various strains of bacteria and fungus

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Abstract: In recent years Bacterial and fungal diseases have become one of the growing health problems globally. Many researchers have shown the effectiveness of metal oxide nano particle and nano composites against strains of various microbes. In the current study bismuth doped cobalt oxide / zirconium oxide nanocomposites were prepared by varying doping concentrations 1%, 3%, and 5% following the co-precipitation method. Presence of functional groups were analyzed by FTIR, surface morphology was examined by SEM-EDS. Additionally, antimicrobial activity of the prepared compounds was analyzed towards gram positive bacterial strains *Staphylococcus Aureus*, *Streptococcus Pneumoniae*, gram negative strains *Escherichia Coli*, *Proteus Vulgaris* and fungal strains *Candida Albicans*, *Aspergillus Niger*. The results obtained exhibited the effectiveness of the produced nanocomposites against strains of bacteria and fungi.

Key Words: Nanocomposites, Antimicrobial activity, Metal oxide nanoparticles

Design and Optimization of Wearable Antenna for Enhanced Wireless Healthcare Monitoring and Diagnosis

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Abstract: Wearable antennas are the key for next-generation wireless healthcare monitoring systems, which enable real-time data transmission without any disturbance. The present work proposes a flexible wearable antenna operating at 2.4 GHz, which is optimized for enhanced wireless healthcare applications. The proposed antenna is made from a composite substrate of copper-nickel and polyester, providing flexibility and durability. Graphene ink is used as the radiating element, which provides excellent conductivity and mechanical stability. The proposed antenna achieves a peak gain of 5.2 dBi and an efficiency of 86%, which is excellent for wireless performance. Extensive parametric analysis and optimization ensure impedance matching and stable radiation characteristics, even under bending conditions. Measured results validate its effectiveness for wearable applications such as ECG, EEG, and SpO₂ monitoring. The inclusion of graphene ink and flexible materials makes this antenna promising for a wide range of applications, including smart textiles and biomedical applications that may contribute to the advancement of sustainable high-performance wearable communication systems.

Key Words: Wearable antenna, Wireless healthcare, Graphene ink

Synthesis of Cu-NiO nanoparticles by co-precipitation method for photocatalytic applications

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Abstract: Primary applications for photocatalysis include water splitting, sludge treatment, and the destruction of harmful contaminants. Typically, metal oxide semiconductors like NiO are used as photocatalysts. To alter the photocatalytic properties of NiO nanoparticles, copper can be doped into them. Thus, pure NiO and Cu-NiO nanoparticles were prepared by simple co-precipitation method using precursors like salts which contain nickel and copper, along with sodium hydroxide. The prepared nanoparticles are characterized by field emission scanning electron microscope (FESEM), DRS UV-Vis spectrophotometer, X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), photoluminescence (PL) spectroscopy. For photocatalytic activity studies, Rhodamine B dye is chosen to understand the degradation tendency of the synthesized nanoparticles. It was found that the selected dye breaks down to the corresponding by-products under exposure to ultraviolet radiation.

Keywords: NiO nanoparticles, Rhodamine B dye, Face-centered cubic (FCC) structure, Photocatalysis, Band gap energy.



Development of Bio-material electrolyte for conducting energy storage devices

PH -07

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Abstract: Extensive research into sustainable materials that guarantee safety, high ionic conductivity, and long-term stability has been prompted by the growing need for high-performance solid-state electrolytes (SSEs) in next-generation battery technology. Although the biodegradability and flexibility of biopolymers like chitosan, cellulose, and derivatives based on starch have been investigated, their usage in high-energy-density batteries is limited by their low ionic conductivity ($\sim 10^{-5}$ S/cm), poor thermal stability, and mechanical constraints. On the other hand, biomaterials, such as hybrid inorganic-organic materials, bio-glasses, and bio-ceramics (such as lithium lanthanum zirconate (LLZO)), provide a number of benefits, including increased mechanical robustness, improved ionic transport efficiency, and superior electrochemical stability. Comparative literature study shows that biomaterial electrolytes have broader electrochemical windows (~ 5 V vs. ~ 2.5 V for biopolymers), larger conductivity ($\sim 10^{-3}$ S/cm) and greater thermal stability ($>200^\circ\text{C}$ vs. $\sim 150^\circ\text{C}$ for biopolymers). A successful processing method that allows for scalability while maintaining the biodegradability and electrochemical advantages of biomaterials is solution casting. Furthermore, research on bacterial cellulose-based electrolytes infused with alkaline solutions (KOH, NaOH) and chitosan membranes doped with phosphoric acid shows enhanced ionic performance and extended battery life. Notably, biomaterial-based electrolytes also improve battery safety by suppressing lithium dendrites. Despite these benefits, there are still obstacles to overcome in the development of flexible & scalable biomaterial electrolytes, reasonably priced fabrication techniques. Future studies should concentrate on hybrid biomaterial-biopolymer composites in order to maximize their electrochemical and mechanical flexibility. This analysis highlights biomaterials as a viable substitute for biopolymers in SSEs, opening the door to high-performance, environmentally friendly energy storage options.

Keywords: solid-state electrolytes, chitosan, cellulose, starch-based, biomaterials, lithium lanthanum zirconate, bio-glasses, Hybrid, Inorganic, organic materials, Alkaline, lithium dendrite, high-performance

Structural and Magnetic Properties of Zinc Substituted Mg Ferrite Synthesized by Sol-Gel Method

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Abstract: Crystallite size variation has been observed to be similar in all the 3 methods- Scherrer equation, Williamson-Hall plot and the Scherrer plot, but for a higher magnitude in the case of Scherrer plot. Average force constant determined through FTIR has been observed to increase with increasing Zn content. Elastic constants have been determined from FTIR. Grain size decreased with increasing concentration of Zn. A significant decrease in saturation magnetization has been observed with increasing Zn content.

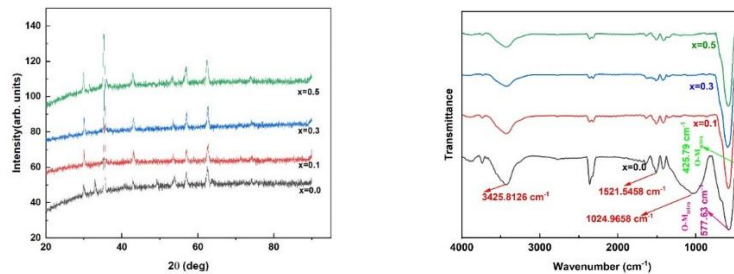


Fig. 1. XRD patterns of $Mg_{(1-x)}Zn_xFe_2O_4$ **Fig. 2.** FTIR absorption spectra of $Mg_{(1-x)}Zn_xFe_2O_4$ Soft ferrite which has high magnetic permeability & loss, low Curie temperature is a potential material for Cancer therapy. The present study aims on investigation of the influence of zinc substitution in Mg ferrite $Mg_{(1-x)}Zn_xFe_2O_4$ ($x = 0.0, 0.3, 0.5, 0.7$) on the crystalline structure, magnetic properties. The $Mg_{(1-x)}Zn_xFe_2O_4$ synthesised by sol-gel route is investigated by X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Vibrating sample magnetometer (VSM).

Key Words: Crystallite size, Zinc substitution, Mg ferrite, Magnetic properties, Sol-gel method



Growth and Characterization of SnS Thin Films by Magnetron Sputtering for Photovoltaic Applications

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Abstract: Tin sulphide (SnS) has emerged as a promising material for thin-film solar cell applications due to its earth-abundant constituents, suitable optical band gap, and favorable electronic properties. In this study, we report on the growth and comprehensive characterization of SnS thin films prepared by magnetron sputtering, with a focus on their potential for photovoltaic applications. The SnS thin films were prepared by the plasma treatment and vacuum annealing of SnS₂ thin films deposited on glass substrates by RF magnetron sputtering. The influence of plasma treatment time and vacuum annealing temperature on the structural and optoelectronic properties of SnS thin films were systematically investigated. Structural characterization via X-ray diffraction (XRD) and scanning electron microscopy (SEM) revealed the crystalline quality, grain size, and morphology of the deposited films. The optical properties were assessed through UV-visible spectroscopy, providing insights into the optical band gap, absorption coefficients, and transparency of the films. Moreover, electrical measurements, including Hall Effect measurements, were conducted to determine the carrier concentration, mobility, and resistivity of the SnS films. This study provides a comprehensive understanding of the growth and characterization of SnS thin films by magnetron sputtering, offering valuable insights into the material's potential for efficient and cost-effective thin-film solar cell applications.

Keywords: Tin Sulphide (SnS), Thin Films, Magnetron Sputtering, Optical Band Gap, Optoelectronic Properties, Hall Effect Measurements, Solar Cells.



Effect of Ammonium thiocyanate on the optimized polymer (PVA) and Amino acid (β – Ala) electrolyte

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Abstract: Proton-conducting polymer electrolytes based on polyvinyl alcohol (PVA) doped with beta-alanine and varying molecular weights of ammonium thiocyanate were synthesized using the solution casting technique with distilled water as the solvent. X-ray diffraction (XRD) analysis confirmed the amorphous nature of the polymer electrolytes, while Fourier-transform infrared (FTIR) spectroscopy verified the complex formation between PVA, beta-alanine, and ammonium thiocyanate. AC impedance studies determined the maximum ionic conductivity to be $1.421 \times 10^{-4} \text{ Scm}^{-1}$ for the polymer system composed of 90 wt% PVA:10 wt% beta-alanine:30 wt% NH_4SCN at room temperature. The conductivity exhibited a temperature-dependent Arrhenius behavior for the highest conducting sample. A primary proton conducting battery will be constructed using highest conducting sample.

Keywords: PVA, Beta alanine, Ammonium thiocyanate, ac impedance, proton battery



Unveiling the Structural, Electronic, and Optical Properties of bis(4-methoxybenzylammonium) tetrachloridozincate: A DFT Perspective

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Abstract: In this study, we present a comprehensive theoretical investigation of the structural, electronic, and optical properties of the semi-organic material bis(4-methoxybenzylammonium) tetrachloridozincate using Density Functional Theory (DFT). The computational analysis was performed using the Gaussian 16 package with B3LYP hybrid functional and LANL2DZ basis set, visualized through Gauss view 6.1.1. Vibrational characteristics were analyzed through FTIR and FT-Raman spectroscopic calculations, complemented by Potential Energy Distribution (PED) analysis. Detailed bonding interactions and molecular behaviour were examined through topological analysis, including Atoms in Molecules (AIM), Electron Localization Function (ELF), Localized Orbital Locator (LOL), and Non-Covalent Interaction-Reduced Density Gradient (NCI-RDG) calculations. Molecular reactivity was explored through Molecular Electrostatic Potential (MEP), Natural Bond Orbital (NBO) analysis, and Fukui function calculations. Temperature-dependent thermodynamic properties were simulated to understand the material's thermal behaviour. Electronic and optical properties were investigated using Time-Dependent DFT (TD-DFT) at the CAM-B3LYP/LANL2DZ level, including Frontier Molecular Orbital (FMO) analysis, UV-Visible spectroscopy, and Photoluminescence studies. The computed electronic properties suggest promising potential for Non-Linear Optical (NLO) applications.

Keywords: Semi-Organic material, DFT, FTIR, FT-RAMAN, MEP, NLO, UV-Vis, NCI-RDG, Thermodynamic, Gaussian 16.

Effect Of Drifting Ions on The Ion Acoustic Shock Waves in The Inner Shock Region of Comet 1p/Halley

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Abstract: We investigate the formation of ion acoustic shock waves in a plasma of solar and cometary electrons modelled by kappa distribution, a drifting H_3O^+ ion and a pair of oppositely charged oxygen ions described by q – non extensive distribution. The Korteweg-deVries-Burger's (KdVB) equation for this plasma composition has been derived and various characteristics of shock waves are studied for parameters relevant at the inner shock region of comet Halley. It is found that the strength of shock wave is significantly depending on the density, viscosity and charge number of H_3O^+ ions. The spectral indices of both solar and cometary electrons also play a key role in the speed of propagation and width of the shock wave; both shock speed and width increase as the spectral indices increase or as the suprathermal distribution merges to a Maxwellian distribution. Our results may help in the understanding of in-situ measurements of shock waves formed in various cometary plasmas.

Keywords: Comet 1P/Halley, Ion acoustic shock waves, Korteweg-deVries-Burger's (KdVB) equation, q – nonextensive distribution, Maxwellian distribution.

Phase evolution in the formation of molybdenum doped strontium ironoxide for energy applications

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Abstract: The demand for cleaner, more sustainable energy source has driven extensive research into solid oxide fuel cells (SOFCs), which are widely regarded as efficient and eco-friendly energy devices. Among potential materials for SOFC electrodes, doped strontium ferrite perovskites have gained considerable attention due to their advantageous properties, such as high ionic conductivity and stability at elevated temperatures. This study investigates phase evolution during the synthesis of molybdenum-doped strontium ferrite oxide via a solid-state reaction method for potential energy applications. Precursors calcinated at 900° showed the formation of strontium iron oxide compounds along with scheelite SrMoO₄. On heating the precursors above 1000°, molybdenum diffused into strontium iron oxides forming cubic perovskite SrFe_{0.8}Mo_{0.2}O₃ (16% by weight) with lattice parameter a=3.91Å. Formation of double perovskite Sr₂Fe_{1.33}Mo_{0.66}O₆ occurs on increasing the sintering time. Cubic nature of Sr₂Fe_{1.33}Mo_{0.66}O₆ with space group Fm-3m with a= 7.86Å was confirmed by XRD analysis. The tolerance factor was calculated to confirm the cubic structure. However no structural change was observed on further increasing the sintering time. Absorption bands in FTIR at 820 and 621cm⁻¹ corresponds to MoO₆ and FeO₆ octahedron confirming perovskite formation. Formation of double perovskite was confirmed by the blue shift in samples sintered for longer time. Morphological variation analyzed by SEM and EDAX data shows phase purity of all samples. Dielectric studies are conducted from 4 Hz to 5 MHz. Permittivity and loss tangent followed similar pattern of frequency dependence at lower frequencies and stabilize at higher frequencies; conductivity increased with increasing frequency.

Key Words: Solid oxide fuel cells (SOFCs), double perovskite, dielectric, tolerance factor

Electrical Performance of Magnesium Doped Cerium Oxide Nanoparticles via Eco-friendly Method

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Abstract: Magnesium doped cerium oxide nanoparticles are synthesized by the environmentally friendly method using *Piper longum* and characterized using various analytical techniques. Using X-ray diffraction (XRD) analysis, the phase purity and crystallinity of the cubic structure of Mg-doped CeO₂ nanoparticles were confirmed. The produced nanoparticles' surface functional groups and M–O bond bending and stretching vibrations were studied using Fourier transform infrared spectroscopy (FTIR). The produced nanoparticles' altered shape (from sphere to polyhedral) was deduced using both scanning electron microscopy (SEM). EDAX analysis confirmed the purity of the prepared nanoparticles. The optical property of the pure and doped CeO₂ NPs is studied using UV-DRS analysis. Using HIOKI LCR meter, the electrical conductivity of the pure and Mg doped CeO₂ NPs is measured at room temperature.

Keywords: Piper longum, metal oxide, Mg doping, dielectric analysis.

Comparative Analysis of Advanced Machine Learning Models for Groundwater Level Prediction in Southern Tamil Nadu Using ANFIS, LSTM, and ARIMA

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Abstract: Groundwater level prediction is critical for effective water resource management, particularly in regions experiencing erratic rainfall patterns and increasing demand. This study employs Adaptive Neuro-Fuzzy Inference Systems (ANFIS), Long Short-Term Memory (LSTM) networks, and AutoRegressive Integrated Moving Average (ARIMA) models to analyze and forecast groundwater trends across Chennai, Kanchipuram, and Tiruvallur districts in southern Tamil Nadu. Groundwater fluctuations are examined for pre-monsoon, monsoon, and post-monsoon periods, considering the region's hydroclimatic variability. The predictive models are evaluated based on statistical performance metrics, including Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Coefficient of Determination (R^2), ensuring a robust comparative analysis. Results indicate that LSTM models outperform traditional statistical approaches (ARIMA) by capturing non-linear dependencies, while ANFIS demonstrates superior adaptability to localized hydrogeological conditions. The integration of Geographic Information System (GIS) tools enables spatial visualization of groundwater level variations, providing an intuitive representation of trends across the study area.

Findings from this research offer data-driven insights for groundwater management, aiding policymakers in developing sustainable extraction strategies under climate change scenarios. The study underscores the potential of hybrid AI-driven methodologies in groundwater forecasting, emphasizing the need for region-specific model optimization. The combination of deep learning, fuzzy logic, and statistical modeling presents a powerful framework for improving groundwater resource assessments, contributing to more resilient water management policies.

Keywords: Groundwater level prediction, ANFIS, LSTM, ARIMA, Hydroclimatic variability, GIS, Water resource management, Deep learning, Statistical modeling, Sustainable extraction strategies.

Particle Accelerators in Cancer Treatment: Advancing Precision Oncology with Particle Beam Therapy

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Abstract: Particle accelerators have emerged as a powerful tool in cancer treatment, primarily through the technique of particle beam therapy. This innovative approach involves using accelerated particles, to target and destroy cancer cells with precision. Particle beams deliver higher energy doses with greater accuracy, minimizing damage to surrounding healthy tissue. The ability to penetrate deeper into tissues while concentrating energy at the tumour site makes particle accelerators particularly effective for treating tumours located in critical areas. Additionally, ongoing advancements in accelerator technology are improving treatment efficiency, reducing treatment times, and increasing patient outcomes. This growing field represents a promising future for precision oncology, offering an alternative or complementary strategy to conventional radiation therapies.

Keywords: Particle accelerators, Particle beam therapy, Cancer treatment, Precision oncology, Radiation therapy, Tumour targeting, High-energy beams

Structural, thermal and electrochemical Studies of Kappa carrageenan-based electrolytes for Sodium ion batteries

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Abstract: A solid biopolymer electrolyte (SBPE) with Kappa carrageenan (KC) and sodium chloride (NaCl) has been prepared by solution casting method for the fabrication of solid-state sodium ion battery (SIB). The X-ray diffraction (XRD) method confirms the crystalline/amorphous nature of the prepared solid biopolymer electrolytes (SBPEs). The glass transition temperature (T_g) of prepared electrolytes was investigated by using differential scanning calorimetry (DSC). The SBPE with a concentration of 1g KC: 0.6 Mwt% of NaCl has low T_g value (48.94 °C) when compared to other salt concentration. AC impedance study shows that the pure KC has ionic conductivity of 1.85×10⁻⁵ S cm⁻¹. However, addition of salt increases the ionic conductivity to 9.37×10⁻⁴ S cm⁻¹ at the room temperature for 0.6 Mwt% of NaCl. Cyclic voltammetry (CV) analysis was used to determine the cycling stability of highest conducting electrolyte 1g KC with 0.6 Mwt% NaCl.

Keywords: kappa carrageenan, sodium chloride, AC impedance, sodium ion battery.

Emerging Trends in Portable and AI-Driven Non-Destructive Testing for SMEs

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Abstract: Non-Destructive Testing (NDT) is a variety of techniques used to collect information about a material's structure and components and evaluating them without damaging them. It is a very costly and complex method of specialised methods of testing machineries. In such condition, the small and medium enterprises (SMEs) find it difficult to utilise this and at times it is unavailable due to its cost and expertise. For a matter of fact, recent advancements in artificial intelligence (AI) and portable NDT techniques are helping to bridge this gap, making quality control more accessible and efficient even at the levels of SMEs. This paper explores how AI-driven automation, machine learning, and real-time data analysis are transforming NDT for SMEs. The paper will discuss the innovation and its reduction in costs, simple detection of defects along with improving production. With the use of AI and portable technologies, SMEs can now implement effective quality assurance strategies without the need for costly resources, improvising the playing field in industries were precision and reliability.

Keywords: AI, Machine learning, portable NDT, small medium enterprise, Defect detection



Biological Performance of Magnesium Oxide-Copper Oxide Nanocomposites using Agro Waste

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Abstract: By producing materials that are stronger, lighter, more resilient, and multifaceted, nanocomposites transforming a number of sectors. They have a wide range of uses, from energy and environmental protection to aerospace and medical, making them vital to contemporary technology and sustainable growth. In the present study, we explore the biocidal effect of MgO/CuO Nanocomposites using Banana Spathe extract. The nanocomposites undergone structural, morphological and optical analysis and tested for their antimicrobial efficacy against a diverse range of microorganisms. This innovative approach harnesses natural extracts and nanotechnology to develop environmentally friendly and potent antimicrobial agents. The findings of this study hold promise for applications in various fields, including healthcare, agriculture, and food safety, addressing the urgent need for effective and sustainable antimicrobial solutions.

Keywords: Banana spathe, nanocomposites, anti-bacterial analysis.



Unveiling the Structural and Electrochemical Behaviour of Ni-MOF

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Abstract: Metal-organic frameworks have recently garnered a lot of attention especially as electrode materials for supercapacitors. Nickel-based metal-organic frameworks (Ni-MOFs) among them have attracted significant interest for their potential applications in energy storage and electrocatalysis. In this study, Ni-BDC MOF was synthesized via one-pot solvothermal route and characterized using X-ray diffraction (XRD) and cyclic voltammetry (CV). XRD analysis confirmed the successful formation of the crystalline framework, with characteristic diffraction peaks corresponding to the Ni-MOF structure. The crystallite size and phase purity were determined from the XRD data. Electrochemical performance was evaluated using CV, revealing the redox behaviour of the Ni-based active sites. The CV results demonstrated reversible faradaic reactions, indicating the potential of Ni-MOF for charge storage applications. The combined structural and electrochemical analysis provides insights into the feasibility of Ni-MOF in electrochemical applications.

Keywords: Supercapacitors, Metal-Organic Framework

Computational Investigation of 3-(1-Phenyl-2,3-Dimethylpyrazolone-5) azopentane-2,4-dione: DFT Studies, Spectroscopic Analysis, and Molecular Docking Insights

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Abstract: In this study, a comprehensive Density Functional Theory (DFT) investigation was conducted on the synthesized compound 3-(1-Phenyl-2,3-Dimethylpyrazolone-5) azopentane-2,4-dione to explore its structural, electronic, and physicochemical properties. The synthesized compound was characterized by NMR (¹³C and ¹H), UV, FT-IR analytical tools. The study aimed to analyze electronic structure, reactivity, spectroscopic characteristics, non-linear optical (NLO) behavior, stability, intermolecular interactions, solvent effects, and molecular orbitals along with charge distribution (MEP, FUKUI, RDG, and NBO). These properties play a crucial role in determining the compound's chemical reactivity and potential applications in material science and pharmaceuticals. The computational methodology employed Gaussian 16 software, utilizing the B3LYP functional with the 6-311++G (d, p) basis set for accurate energy calculations and structural optimization. Time-dependent DFT (TD-DFT) was applied to compute theoretical spectra, providing valuable insights into the electronic transitions and optical behavior of the compound. The influence of different solvents on its electronic properties was also examined to understand environmental effects on stability and reactivity. Furthermore, Molecular docking was also evaluated in an in-silico study for its antioxidant properties these studies were performed to assess the binding efficiency of the compound with biological receptors by calculating binding energy and interaction modes. This evaluation provides a theoretical basis for its potential application in drug design and bioactivity prediction. The combined computational approach offers deep insights into the physicochemical behavior of the compound, aiding in the rational design of new materials and biologically relevant molecules.

Keywords: Dft, Nlo, Mep, Fukui Function, Molecular Docking.

Fluid Dynamics: Bridging Biological Systems and Atmospheric Phenomena

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Abstract: Fluid dynamics, a fundamental branch of physics, explores the movement of liquids and gases, playing a vital role in various fields, including biology and meteorology. In human physiology, it helps explain blood circulation, contributing to advancements in medical device development and cardiovascular disease treatment. On a broader scale, it is essential in meteorology, facilitating weather prediction by analyzing air mass movements, cloud dynamics, and storm formation. Additionally, fluid dynamics has applications in engineering, environmental science, and sports, improving system efficiency and performance. Spanning from microscopic biological functions to large-scale atmospheric processes, this field is crucial for understanding and controlling fluid motion across multiple disciplines.

Keywords: Fluid dynamics, liquid motion, gas flow, blood circulation, cardiovascular applications, meteorology, weather prediction, air mass movement

Surface Urban Heat Intensity (SUHI) analysis based on temperature and precipitation of Chennai district using Wavelet analysis

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Abstract: The industrial growth of a city causes the formation of urban heat islands (UHI). The formation of UHI has become a common phenomenon among cities due to rapid growth. It is especially severe for developing countries like India, staging inflated urban development. It is expected that the impact of climate change in our city would be high and its intensity should be calculated in terms of heat emissivity and temperature anomaly to understand the severity of the UHI effect and to predict its trend for future and mitigate the climate change by adapting the sustainable way of development. The rapid urbanisation of our city is a rising concern regarding both environment and sustainability.

The increased development of cities could produce an urban heat island (UHI) by forming a local climate zone (LCZ) within the city. The LCZ characterized by UHI might be warmer than surrounding locations with similar topography due to the concentration of buildings, industry, automobile etc causing increased heat emission the carbon outage in the atmosphere of Chennai can be directly correlated to the increased temperature with reference to temperature anomaly data and real-time observation of both surface and air temperature.

. The possibility of developing a mathematical model or an algorithm to predict the intensity of UHI could be explored which can be useful as key tool in urban design analysis, and sustainable development that result in scientific planning for city development and ultimately reduces the gross carbon emission of Chennai to become a carbon neutral city.

Keywords: Urban heat island, Climate change, Temperature anomaly, Sustainable development



A Systemic Review, on some properties of Brucine based single crystal for NLO Applications

PH -24

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Abstract: Brucine appears as a white crystalline solid. Combustible but may require some effort to ignite. Toxic by inhalation (vapor, dust, etc.) and ingestion. It is Colorless or white odorless solid; Slightly soluble in water (3.2 g/L at 15 deg C); It is also Odourless, very bitter in taste. Its Boiling Point is 470 °C and Melting Point is 352 F. It is soluble in water or alcohol. The solutions are neutral or slightly acid. The crystal of brucine is highly transparent which is very important for optical applications. There are different applications of brucine in medical science also. Some of the physical and chemical instability of amorphous pharmaceuticals during storage has become a major problem for the pharmaceutical industry, as most of the pharmaceuticals including some lifesaving drugs are also found to be poorly water soluble. Molecular mobility is a key factor to understand the various crucial parameters that determine the stability of amorphous phase. Before the design of brucine-containing transdermal formulations, the pharmacodynamics and pharmacokinetics of brucine following transdermal administration should be evaluated. In this study, the effect of addition of ethanol on solubility of brucine was investigated and 20% ethanol was added into PBS to obtain 10 mg/mL brucine solution. Brucine (BRU), is a natural plant whose alkaloid is reported to possess cytotoxic and antiproliferative activities. We also study that brucine is aimed to investigate in vitro and in vivo antitumor and antiangiogenic effects.

Keywords: Brucine, Solubility, Pharmacokinetics, Antitumor effects, Cytotoxicity, Optical applications, Transdermal formulation, Alkaloid



Plasma Treated Alkaline Earth Metal Doped with Transition metal oxides for chromic application

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Abstract: The proposed work focuses on enhancing the chromic properties of magnesium-doped vanadium oxides (Mg-doped V₂O_x). Vanadium oxide nanoparticles were synthesized using the hydrothermal method followed by successive annealing. The reddish-brown colour of the vanadium oxide nanoparticles changes to yellow after annealing. Magnesium-doped V₂O_x nanoparticles were also formed during the process. The phase of the prepared nanoparticles was analyzed using X-ray diffraction, revealing a grain size of approximately 40 nm and an orthorhombic structure. Further thermochromic studies will be conducted before and after plasma treatment to assess the enhancement in chromic properties.

Key words: Vanadium oxides, Chromic properties, Hydrothermal, Plasma Treatment

The Importance of Green Technologies for Environmental Protection

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Abstract: Environmental degradation has spurred a shift in society's attitude to development, resulting in the emergence of sustainable development. Climate change and environmental imbalances have become major worldwide concerns in recent years. Climate change causes difficulties such as global warming, ozone layer depletion, natural resource degradation, soil erosion, and deforestation. Green technologies, which are distinguished by their minimal environmental impact and resource efficiency, have emerged as critical instruments for accomplishing sustainability objectives. As governments attempt to transition to greener economies, recognizing the benefits and constraints of technology transfer in the context of green technologies becomes critical. Green technology promotes and supports methods for sustainable development that solve environmental concerns and provide long-term solutions. Sustainable development necessitates the use of new, environmentally friendly technologies. Green initiatives seek to preserve and improve the environment for a future civilization that prioritizes resource efficiency and sustainability. A comprehensive review research article like this one delves deep into the delicate interplay between green technology and sustainable development, shedding light on cutting-edge concepts that have the potential to lead the way for a more environmentally conscious future.

Keywords: Green technology, Sustainable development, Climate change, Environmental impact, Resource efficiency

Enhanced Photocatalytic performance of Zn-Co doped FeMnO₃ nanostructures

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Abstract: Undoped FeMnO₃ and Zn-Co-doped FeMnO₃ taken in various ratios of 1%, 3%, and 5%, were synthesized via the sol-gel auto-combustion route. The synthesized nanoparticles were confirmed by the structural analysis. The structural properties were investigated through XRD; it will confirm the synthesized materials are in the crystalline phase. To apply the Debye-Scherrer formula, the crystal sizes were found for undoped FeMnO₃ and Zn-Co-doped FeMnO₃ (1%, 3%, & 5%). When determining the crystal sizes, the wide peaks were taken into consideration. It is found in the range of 12-26 nm. The synthesized nanoparticle morphology was found using SEM characterization. In the SEM morphology, the particles are appeared agglomerated state due to the sudden combustion process. The shape of the synthesized materials are spherical particles under a magnification of 500 nm scale bar. EDX spectrum analysis confirms that Fe, Mn, Zn, Co, and O are present in the synthesized materials. XPS measurements verified the element identifications, peak locations, and oxidation states. The photocatalytic behavior of the prepared samples was tested using UV-visible spectroscopy, The organic pollutant, Methylene Blue (MB) dye was degraded over time. The various degradation times and percentages of degradation confirmed the removal of the pollutant.

Keywords: XPS measurement; SEM Morphology; Photocatalytic



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Enhanced physicochemical properties of ZnO nanoparticles: Effect of surfactants on crystallite size, optical band gap, morphology and colloidal stability of ZnO nanoparticles

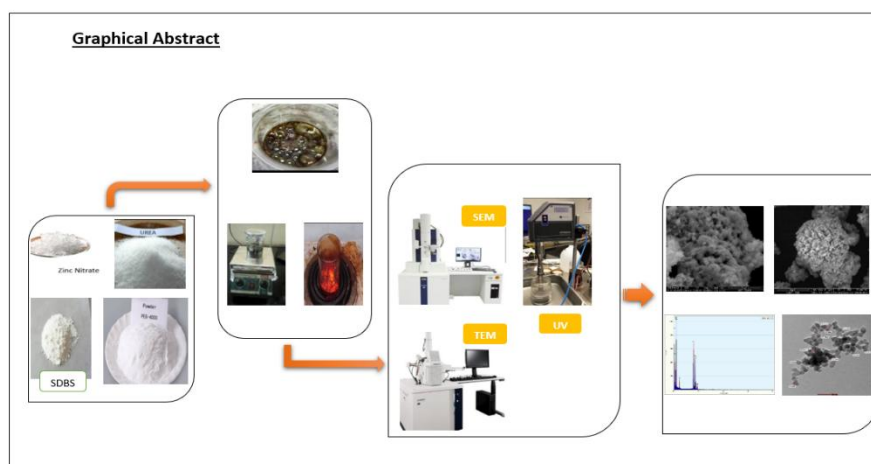
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Abstract: Using urea, a straightforward and economical combustion process was used to create ZnO nanoparticles (NPs). Three surfactants were examined for their impact on the physicochemical characteristics and preparation of NPs. The impact of surfactants on crystallite size and lattice constant was calculated. It shows that the crystallite size of ZnO NPs is very less for the sample prepared using Sodium dodecyl benzene sulfonate (SDBS) than the others. The functional group analysis of ZnO NPs under various surfactants was recorded using FTIR. The change in morphology of ZnO NPs for different surfactants was visualized through SEM and the elements present in all the samples were recorded by EDX spectra. Using UV spectra, the optical band gap of ZnO NPs was determined. Compared to the other samples, the sample made using SDBS had the lowest band gap value, measuring 4.3 eV. It demonstrates that their optical band gap was significantly influenced by the crystallite and surfactants. Zeta potential values were used to investigate the colloidal stability of ZnO nanoparticles. ZnO NPs made with SDBS exhibit greater colloidal stability than the other samples. ZnO nanoparticles' promising physicochemical characteristics make them suitable for a number of uses, including gas sensors, biosensors, photocatalysts, and more.

Keywords: Zinc Nitrate, Urea, SDBS Sodium Dodecyl Benzene Sulfonate, Sensor and Combustion process.





CH-02

Synthesis and Hydrogen Production of MoS₂ by Hydrothermal Method

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Abstract: Hydrogen is gaining recognition as a clean and renewable energy carrier, offering a sustainable alternative to traditional fossil fuels due to its zero-carbon footprint and high energy density. Among the various methods of hydrogen production, water electrolysis is emerging as a primary technology, especially when coupled with renewable energy sources. This study focuses on the development of a MoS₂ electrocatalyst synthesized on a carbon cloth substrate via a hydrothermal method. The structural, optical and elemental composition of the samples were analysed through X-ray diffraction, UV-Vis absorption spectra, Photoluminescence spectra, and X-ray Photoelectron spectra (XPS) studies. Electrochemical assessments showed that MoS₂ exhibited a hydrogen evolution reaction (HER) with an onset potential of -0.3 V, Notably, the ultra-low overpotential of -0.40 V for MoS₂, underlined their exceptional catalytic effectiveness.

Keywords: MoS₂, Hydrothermal, Hydrogen Production

Phytochemical analysis and Pharmacological Evaluation of Crude Extract of Citrus Fruit Peel Waste

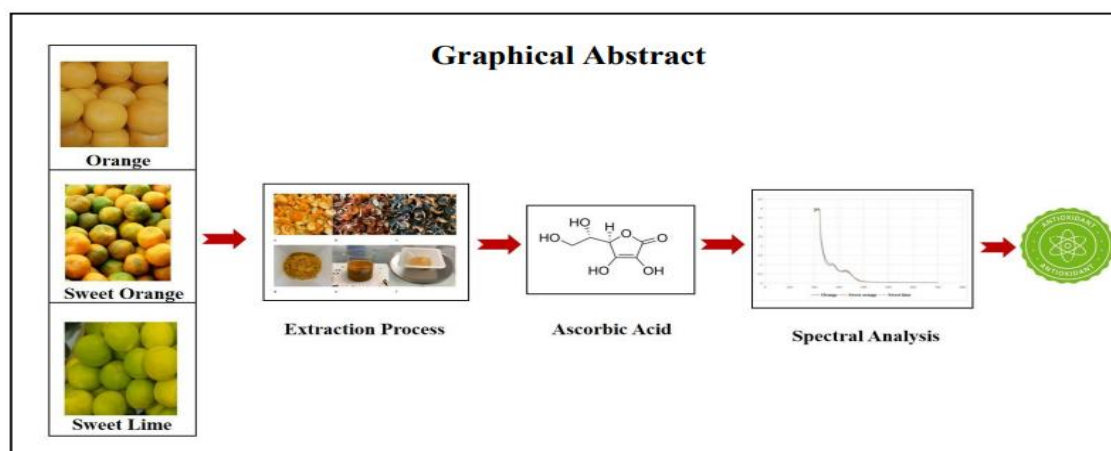
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Abstract: Ascorbic acid, commonly known as vitamin C, is a crucial water-soluble vitamin with diverse physiological action. Its deficiency leads to scurvy, characterized by fatigue, weakened immunity, and consecutive tissue disorders. Due to its role in reducing inflammation and improving cardiovascular health, ascorbic acid is widely used in medical and dietary application. Ascorbic acid is not only present in juice of fruits and vegetables but is also present in waste of fruits and vegetables, such as peels and seeds. Citrus fruit waste such as orange, sweet orange and sweet lime were chosen for extraction of ascorbic acid. The extraction was carried out using an ethanol under controlled temperature and pH, aimed at minimizing oxidative degradation. Preliminary phytochemical analysis and iodine starch test confirmed the presence of ascorbic acid. Further it was confirmed by UV-Visible (265nm) and IR spectra (1674 cm⁻¹). Overall, the proposed method offers a cost effective, sustainable and efficient approach to harnessing the nutritional benefits of citrus derived ascorbic acid. Sample will be evaluated for biological studies.

Keywords: Ascorbic Acid, Orange, Sweet Orange, Sweet Lime, UV-Visible, IR Spectra





CH-04

AZADIRACHTA INDICA LEAF EXTRACT AS A CORROSION INHIBITOR FOR MILD STEEL IN HYDROCHLORIC ACID

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Abstract: Ascorbic acid, commonly known as vitamin C, is a crucial water-soluble vitamin with diverse physiological action. Its deficiency leads to scurvy, characterized by fatigue, weakened immunity, and consecutive tissue disorders. Due to its role in reducing inflammation and improving cardiovascular health, ascorbic acid is widely used in medical and dietary application. Ascorbic acid is not only present in juice of fruits and vegetables but is also present in waste of fruits and vegetables, such as peels and seeds. Citrus fruit waste such as orange, sweet orange and sweet lime were chosen for extraction of ascorbic acid. The extraction was carried out using an ethanol under controlled temperature and pH, aimed at minimizing oxidative degradation. Preliminary phytochemical analysis and iodine starch test confirmed the presence of ascorbic acid. Further it was confirmed by UV-Visible (265nm) and IR spectra (1674 cm⁻¹). Overall, the proposed method offers a cost effective, sustainable and efficient approach to harnessing the nutritional benefits of citrus derived ascorbic acid. Sample will be evaluated for biological studies

Key words: corrosion inhibition, MS, Azadirachta indica, weight loss.



CH-05

Synthesis and Characterisations of chemicals for MOTFT application

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Abstract: Thin Film Transistors (TFTs) are field-effect transistors in which the active semiconductor layer is deposited as a thin film on an insulating substrate, such as glass or silicon. Due to their high switching speed, low power consumption, and compatibility with flexible electronics, TFTs are widely used in display technologies and advanced electronic applications. This study presents the synthesis and characterization of Indium Lead Oxide (ILO)-based Metal Oxide Thin Film Transistors (MOTFTs) featuring a Lead Barium Zirconate (PBZ) gate dielectric. PBZ thin films are fabricated using a cost-effective sol-gel process and deposited onto a doped silicon substrate. The structural, optical, and surface morphological properties of the PBZ thin films are systematically analyzed using X-ray Diffraction (XRD), Ultra-Violet Visible Spectroscopy (UV-Vis), and Atomic Force Microscopy (AFM). XRD confirms the crystalline nature of PBZ, while UV-Vis spectroscopy provides insights into its optical transmittance and bandgap characteristics. AFM analysis reveals the surface uniformity and roughness of the thin films. The results demonstrate that PBZ serves as a promising high-k gate dielectric for MOTFT applications, offering a low-cost, high-performance alternative for next-generation electronic devices.

Keywords: MOTFT, TFT, ILO, PBZ, Dielectric

Characterization and Structural Analysis of Spin-Coated Thin Films of Novel Polyazomethine Incorporating Novel Chromone Units

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Abstract: This study reports on the synthesis and structural characterization of five novel functional polyesters with Chromone based Schiff base linker using polycondensation. The polyesters (P1 to P5) were synthesized via the incorporation of Schiff base linker M1 with different acid chloride in the basic medium. The receptor HSA can expand the polymers into 2D and 3D supramolecular networking via π - π hydrophobic, stacking and H-bonding interactions. In the present investigation, plane glass plates were used as substrates for the deposition of polymer thin films by 'casting from the solution' method. Here the glass plates were washed by acid, water and lastly by soap water. Then, they were rinsed in the distilled water. The cleaned substrates were then dried up in hot air. Solutions of Schiff base polymers (P1 to P5) were prepared at 2%, 5%, and 10% by weight in DMF. The drops of polymer solution were deposited on glass substrate which is placed on the spin coater disc. Each sample was rotated at an optimized speed and time to acquire the required film thickness, were analyzed by FT-IR, and UV-visible spectroscopies. Their morphological properties were studied by Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM).

Keywords: Spin coating, molecular simulation, Azomethine polyesters, Polymers Thin Films, SEM

Adsorption Potential of Eleusine coracana (L.)-Derived Activated Carbon: A Green Approach

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Abstract: This study aimed to show how Eleusine coracana (L) finger millet, an agricultural product, may be used as an efficient activated carbon. The adsorbent was activated using chemical and thermal and microwave methods, and then it was characterized by SEM, FTIR and XRD, to evaluate the physicochemical properties of activated carbon. The FTIR technique revealed the presence of multiple functional groups like hydroxyl, carboxyl, and alkyl, etc., which improved the contact between adsorbate and adsorbent molecules, an amorphous structure, as revealed by the X-Ray Diffraction analysis, which in turn had an impact on the adsorption procedure. The activated carbon that has been prepared was utilized to study the adsorption of anionic and cationic dyes. Among the adsorption isotherm models, the Freundlich isotherm model was the best fit with an experimental value at R², 0.99 showing the adsorption process was heterogeneous. The system adhered to the second-order kinetic model. The maximum adsorption at 313 K indicated that the process is endothermic and confirmed the process's viability. The microwave –activated carbon outperformed two other carbons in cationic dye adsorption, as evidenced by the maximum value of K_f 14.79. As the precursor of choice is an agricultural product and edible, the carbon produced must not have any detrimental effect on health or the environment.

Key words: Finger millet, isotherm, exothermic, thermodynamics



CH-08

Advances and Challenges in Synthesis and Applications of Superabsorbent Polymers (SAPs)

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Abstract: Superabsorbent polymers (SAPs) are cross-linked, three-dimensional networks capable of absorbing and retaining water or fluids hundreds of times their weight. Valued for their water retention, biocompatibility, and environmental responsiveness, SAPs are used in agriculture, healthcare, drug delivery, hygiene, and environmental engineering. However, challenges like mechanical strength, swelling behavior, biocompatibility, environmental impact, and cost-effectiveness limit their broader use. Recent advancements, such as stimuli-responsive, biodegradable, and multifunctional hydrogels, offer more sustainable and efficient applications. Continued research and innovation are essential to address these limitations and unlock the full potential of SAPs for diverse and impactful uses.

Key words: Superabsorbent polymers, biocompatibility, healthcare



Biofabrication of CeO-ZnO nanocomposite for Biological and Environmental Applications

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Abstract: In this study, CeO-ZnO nanoparticles were synthesized through a green synthesis method, utilizing environmentally friendly plant extracts as reducing and stabilizing agents. The synthesis was carried out by combining cerium nitrate and zinc nitrate in an aqueous solution, followed by adding the plant extract, which promoted the formation of CeO₂-ZnO nanoparticles. The resulting nanoparticles were characterized using various techniques, including X-ray diffraction (XRD), scanning electron microscopy (SEM), and Fourier-transform infrared spectroscopy (FTIR), to confirm their crystalline structure, morphology, and functional groups. The synthesized CeO-ZnO nanoparticles exhibited enhanced photocatalytic activity, making them promising candidates for applications in environmental remediation, such as the degradation of organic pollutants under visible light. Additionally, the green synthesis approach offers a cost-effective, eco-friendly alternative to conventional methods, reducing the environmental impact and ensuring the sustainability of the process. This work highlights the potential of green synthesis for developing advanced nanomaterials with improved photocatalytic performance.

Key words: phytochemical; green synthesis; crystalline structure; dye degradation; cost-effective



An Alternate Synthesis Routes of Active Pharmaceuticals Ingredients with Commercial Availability of Raw Materials, Usage of Eco-Friendly Reagents and it Efficiently Provides the Desired Active Pharmaceutical Products with Controls of Formation of Impurities

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Abstract: The Synthesis of Semaglutide by coupling of side chain with the peptide backbone in a fragment approach using 2CTC resin, which involves less number of synthetic steps and controlling the formation of various impurities using simple operations and easy to carry out chemical conversions. Further, a purification method has been developed by the present inventors which results in high pure Semaglutide in higher yield and can be useful on the industrial scale. The present invention is simple, safe, economic and suitable for the production of Semaglutide and its side chain on industrial scale in good yield and better quality.

Key words: Back bone; 2CTC resin; Purification; industrial scale.



Bioengineered Copper Oxide Nanoparticles for Improved Biomedical and Environmental Applications: Investigation of Receptor-Ligand Interactions by Molecular Docking Assessment

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Abstract: This study aims to determine the effect of phytochemicals in *Ipomoea SagittifoliaBurm.f* plant extract on bio-mediated Copper oxide nanoparticles (CuO NPs). Different methods were applied to characterize the synthesized NPs. The results confirmed the formation of crystalline and cubic-shaped CuO NPs associated with bio-activated phytochemicals. Gram-positive and Gram-negative bacterial strains were used to test the antibacterial efficiency of NPs. The anticancer action against A549 and MCF7 cell lines were analyzed. The antioxidant tendency of NPs was determined. The interactions between the antibacterial pathogeneses, anticancer cell lines (MCF7), and phytochemical and bio-mediated CuO NPs were analyzed by molecular docking study. The attained results were validated with Amoxicillin standard drug through molecular docking study. In addition, the photocatalytic dye degradation efficiency of CuO NPs was examined for 105 min.

Key words: *Ipomoea SagittifoliaBurm.f*; 2CTC resin; CuO NP; photocatalytic dye degradation.



Novel Synthesis of ZrO₂ nanoparticles/Co²⁺-HOBt (MOF) composite as corrosion inhibitor in highly corrosive environment on mild steel electrode with industrial application

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Abstract: The novel synthesis of efficient deterioration inhibitor for mild steel in aggressive-environments remains a significant challenge. Here, we testify that the synthesized composite material [ZrO₂ nanoparticles/Co²⁺-HOBt (MOF)] metal organic framework which act as corrosion inhibitor. Further the composite was confirmed by the characterization of X-ray Diffraction (XRD), Fourier Transform Infrared (FTIR) and Scanning Electron Microscopy (SEM). To ascertain the corrosion effectiveness rate of the corrosion inhibitor Co-HOBt, were investigated by gravimetric method, electrochemical impedance spectroscopy (EIS), potentiodynamic polarization (PDP) methods, Phase angle and Frequency on mild steel in aggressive environment. The incorporation of ZrO₂ nanoparticles which enhance the MOF's stability and also increase the corrosion resistive behaviour and decrease the corrosion rate. This study demonstrates the potential of MOF-based nanocomposites as effective corrosion inhibitors for industrial applications such as acid pickling, descaling etc.

Key words: ZrO₂ nanoparticles; MOF; corrosion inhibitors.



Synthesis and Characterization of Metal Organic Framework (Mn-HoBt) incorporate ZrO₂ Nanoparticles as a corrosion inhibitor on a mild steel in high aggressive environment

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Abstract: In this synthesis, zirconium oxide nanoparticles were made with a natural extract of *Syzygium cumini* were incorporated with manganese salt of hydroxybenzotriazole (MOF/ZrO₂) composite as a corrosion inhibitor. The confirmation of synthesized (MOF/ZrO₂) composites were characterized by X-ray diffraction (XRD), Fourier transform infrared (FTIR), and scanning electron microscopy (SEM). The synthesized (MOF/ZrO₂) composite nanomaterial were used as a corrosion inhibitor on mild steel in extremely aggressive environment. The synthesized composite material (MOF/ZrO₂) were used to analyse the percentage efficiency and rate of corrosion by gravimetric method (weight loss measurement) and electrochemical chemical method such as electrochemical impedance spectroscopy (EIS), potentiodynamic polarization (PDP), moreover phase angle and frequency were calculated at different concentrations (100 ppm to 500 ppm). The Novel synthesized composite material were reveals safe for the environment, water-soluble and non-toxic also were (MOF/ZrO₂) composite were applied to industrial application such as cleaning machinery parts, acid pickling, descaling etc.

Key words: MOF/ZrO₂; EIS; corrosion inhibitors.



Wildfire Indicators Mapping in Latakia Governorate (Syria) Using GIS Technology

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Abstract: Forests play an important role in maintaining food security for millions of people throughout the world. Mediterranean woods provide a variety of resources and services, including wood and non-wood goods, animal feed, medicinal herbs, and so on. The Mediterranean region is a delicate area because of its genetic richness and extensive human activity. Wildfires have escalated in recent decades due to natural and manmade causes, resulting in the destruction of forests and other natural resources. Wildfires are one of the most important challenges in Syria, particularly in the city of Latakia. The purpose of this work is to identify fire ignition and spread characteristics, as well as to compute dNBR. A GIS was utilized to compute and generate maps for prior factors.

Key words: Forests; wood and non-wood goods; Latakia.



MAPHOL: A Computational Framework for Predicting, Designing, and Evaluating Molecular Synthesis

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Abstract: Molecular design has traditionally relied on retrosynthetic analysis and empirical experimentation, often prioritizing synthetic feasibility over functional performance, sustainability, and cost-effectiveness. To address these limitations, this study introduces Need Driven Molecular Design (NDMD)—a paradigm that prioritizes functional needs before molecular structure selection. NDMD integrates computational chemistry, artificial intelligence (AI), and green chemistry principles to rationally optimize molecular synthesis. We present MAPHOL (Motivated, Attribute-based, Pathway-mapped, Harmonized, Optimized, and Logic-driven)—a computational framework that underpins NDMD, offering a structured methodology applicable to pharmaceuticals, materials science, and industrial chemistry. As a proof of concept, NDMD and MAPHOL are applied to the rational design of PDPF (1 (perfluorophenyl) 3-(6-(3-(2,3,4,5,6-pentafluorophenyl) ureido) pyridin-2-yl) urea), a fluorinated urea derivative with potential applications in organic electronics and advanced materials. Using AI-driven moiety selection, predictive modeling, and synthesis validation, PDPF was systematically designed based on explicit functional needs rather than empirical intuition. Multiple synthetic routes were evaluated using Synthesis Accessibility (SA) Scores, analyzing feasibility, cost-effectiveness, and scalability. Our findings demonstrate that NDMD and MAPHOL provide a systematic, predictive, and functionally driven approach to molecular design, offering a transformative methodology for future research in pharmaceuticals, green chemistry, and advanced material science.

Keywords: Molecular design; NDMD; PDPF; MAPHOL



CH-16

Eco-friendly Synthesis of CuO-ZnO Nanocomposite and their Enhanced photocatalytic degradation of Methylene blue and antimicrobial activity, Cytotoxicity, Antioxidant

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Abstract: This work utilized an eco-friendly approach to synthesize CuO-ZnO nanocomposite using *Macroptilium lathyroides*(L) plant leaves. The synthesized CuO-ZnO NCs were characterized by UV-visible spectroscopy, FTIR, XRD, SEM-EDX, HRTEM-EDX, XPS, DLS, and Zeta potential. CuO-ZnO NCs showed maximum absorbance range at 310 nm and the energy band gap was measured to be 2.5 eV. XRD reveals the presence of CuO and ZnO in the CuO-ZnO NCs, related to the standard JCPDS No. 089-5895 and card No.003-0888. The FT-IR spectra showed the formation of CuO-ZnO NCs metal-oxygen bonds. The stability and hydrodynamic radius of CuO-ZnO NCs were examined using zeta potential and DLS study. The photodegradation of CuO-ZnO NCs on methylene blue dye was studied using sunlight irradiation, which reduced 96.2% within 90 min. At 30 µg, the zone of inhibition visible against the *S. Aureus* was 18mm, *S. pyogenes* 16mm, *K. pneumoniae* 16mm, and *E. coli* 14mm respectively. The antifungal activity of CuO-ZnO NCs observed against *T. viridae* was 13mm and for *C. albicans* 12mm respectively. CuO-ZnO NCs have significant antioxidant activity with $IC_{50} = 167.93 \mu\text{g} / \text{mL}$. Substantial cytotoxic effects were noticed against the lung cancer A549 cell line ($IC_{50} = 31.82 \mu\text{g} / \text{mL}$) and the breast cancer MCF-7 cell line ($IC_{50} = 38.13 \mu\text{g} / \text{mL}$).

Keywords: *Macroptilium lathyroides* (L); Eco-friendly synthesis; CuO-ZnO nanocomposite; Methylene blue degradation; biological study.

Biological activities, Photocatalytic Application, and Molecular Docking Investigations of *Ceropegia debilis* Plant Extract and Bio-Fabricated Zinc oxide Nanoparticles

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Abstract: The present study focused in the development of a stable and efficient metal oxide catalyst to reduce the organic pollutants and infectious disease-causing microorganisms in an eco-friendly manner. Hence the study utilized *Ceropegia debilis* plant extract as a capping and reducing agent to synthesize zinc oxide nanoparticles (ZnO NPs) for this dual-purpose approach. The biogenic ZnO NPs were characterized through various analytical techniques. ZnO NPs exhibited maximum absorbance at 353 nm with an energy gap of 3.1 eV. The average crystallite size of ZnO NPs was determined as 24.8 nm as per XRD data. XRD results also indicates high crystallinity, increased surface defects, oxygen vacancies, and smaller sizes with larger surface area contributes to the remarkable removal efficiency of methylene blue dye of (94.7 %) within 105 min. SEM analysis revealed spherical morphology. Zeta potential value of -19.8 mV indicates moderate stability. Plant extract and ZnO NPs displayed enhanced antibacterial properties against *Staphylococcus aureus*. The maximum zone of inhibition of 17 mm was revealed by ZnO NPs against *S. aureus*. A molecular docking study supports the efficiency of ZnO NPs against the *dihydropteroate synthase* source of *S. aureus* with a docking score of -4.18 kcal/mol. ZnO NPs demonstrated a low IC₅₀ value of 33.24µg/mL against the A549 cell line, DPPH assay presented significant inhibition of free radicals of 63.28 %. Based on the results, the current work reveals that the bio-fabricated ZnO NPs would be an active agent in the treatment of industrial waste water and in bio-medical applications.

Keywords: *Ceropegia debilis*); ZnO NP; molecular docking study; DPPH assay.



Cerium incorporated Ni (OH)₂ nanocomposites for enhanced Supercapacitor application

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Abstract: In this era, the major Problems related to the environment and energy scarcity have attracted considerable interest in the development of materials, electrode components for energy storage applications. One of the most innovative and forward-thinking pieces of developing energy-storage technology is the supercapacitor. Recently, electrochemical supercapacitors receiving increasing attention due to the outstanding features of delivering higher power density than the batteries, higher energy density than conventional capacitors and quick charging-discharging process. Supercapacitor mainly depends on the electrochemical properties of the electrode material, electrolyte and voltage range. Recently, Ni(OH)₂ is a Promising material for energy storage because of its high theoretical capacitance and attractive characteristics. It has a crystalline of hexagonal structure which has performed high surface area and electrochemical conductivity eco-friendly, low cost, which can help in the quick charging and discharging process. Since metal oxides have low resistance and high specific capacitances, they are employed as electrode substrates in high energy and power supercapacitors. We have described the synthesis of pure Ni (OH)₂/Ce nanocomposites in our current study using a pure hydrothermal method in a variety of ratios, and we also need to characterize them using SEM, XRD, TEM, EDAX, FT-IR, GCD, and other techniques. The work illustrates a new method for creating metal oxide-based electrode material, which has important uses in the large-scale production of electrochemical energy storage devices for multiple energy-storage devices.

Keywords: *Nickel hydroxide*; environment; energy; Ni (OH)₂/Ce nanocomposite



Enhanced supercapacitor performance of NiO/Cr nanocomposites

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Abstract: The globe is currently dealing with serious issues related to the world economy and population expansion, which has led to a significant rise in the need for energy. Because of their high-power density, short charge and discharge times and extended cycle life, supercapacitors present a possible alternative strategy for meeting the growing power demands of energy storage devices. Because of its great chemical stability, thermal stability, and other properties, nickel oxide is becoming a popular electrode material for energy storage applications. This increases the electrode's surface area, which can aid in the charging and discharging process, redox, conductivity, and active site. Because of their low resistance and high specific capacitance, metal oxides are utilized as electrode materials in the construction of high energy and power supercapacitors. We have synthesized NiO/Cr nanocomposites in our current study utilizing a simple hydrothermal method with the temperature of 180°C for 24hrs followed by the calcination at 500°C for 4hrs with varying ratios of 5%, 10%, 15% . The NiO/Cr nanocomposite's XRD data demonstrate the phase-pure production of NiO. On the other hand, pure NiO aggregated with other contaminants. Both the crystalline nature and the electrochemical characteristics are enhanced by the addition of Cr and also need to characterize them using SEM, TEM, FTIR, etc. The results of this study show a new method for creating metal oxide-based electrode material, which has important uses in the large-scale production of electrochemical energy storage devices for various energy-saving devices.

Keywords: *Nickel hydroxide*; environment; energy; Ni (OH)₂/Ce nanocomposite

Adsorption of Methylene Blue on Activated Charcoal obtained from Delonix Regia Pods - Isotherms, Thermodynamics and Kinetics.

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Abstract: Activated carbon is synthesized from the pods of Delonix regia and were utilized in a muffle furnace to create activated carbon. The optimized preparation parameters of activated carbon were 2 hours of heating, 60% of H₃PO₄ solution as an activating agent, and 800°C irradiation power. A study was conducted to examine how factors such as the quantity of adsorbent, duration of contact, pH level, and temperature of dye concentration adsorption process impact. Experimental adsorption data was analyzed to compare the best-fitting isotherm models which included Langmuir and Freundlich isotherm models; the best fit for the experimental data was determined by using the R-squared value. Van't Hoff plots were utilized to calculate various thermodynamic parameters such as ΔH° , ΔS° , and ΔG° . Analysis of these values revealed that this adsorption process was defined as being spontaneous, endothermic and rather random. Adsorption kinetics was analysed using pseudo first order, pseudo second order and intraparticle diffusion methods.

Keywords: Activated carbon; Delonix regia; Adsorption kinetics

Spectroscopic and electrochemical characterization of unsymmetrical ferrocene-based schiff base ligands

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Abstract: Ferrocene-containing Schiff base ligands offer unique electrochemical and electronic properties, making them highly attractive for applications in catalysis, chemical sensors, and molecular electronics. This study focuses on the comprehensive characterization of novel unsymmetrical Schiff base ligands derived from ferrocene using FT-IR, ¹H NMR, UV-Vis and mass spectrometry. Electrochemical properties were investigated using cyclic voltammetry (CV), revealing the impact of ligand asymmetry on redox behaviour. Additionally, the coordination behaviour of these ligands with transition metals was explored, demonstrating their potential for electronic properties. This study provides new insights into the structure property relationships of ferrocene-based Schiff bases, paving the way for their use in redox active materials and next generation functional complexes.

Keywords: Electronic properties, Electro chemical properties, Ferrocene derivatives, Chemical sensors, Molecular electronics.



Design and synthesis of unsymmetrical ferrocene-based schiff base ligands for advanced coordination chemistry

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Abstract: Ferrocene-derived Schiff base ligands (There are lot of Schiff bases are available but unsymmetric Schiff bases are rare especially using ferrocene compounds) have gained prominence due to their unique redox properties, stability, and tunable electronic effects. Due to its asymmetric structure, can be used as asymmetric catalyst, antibacterial, mimic molecules during simulate biological processes and used as the catalysts for the olefin polymerization. Asymmetric Schiff bases metal complexes are more superior, in which the specific molecular structure with different functional groups is easily controlled. However, the controlled synthesis of unsymmetrical Schiff base ligands incorporating ferrocene remains a challenge due to steric and electronic asymmetry. In this study, we present a novel synthetic strategy for the preparation of unsymmetrical Schiff bases by selectively functionalizing ferrocenyl aldehydes and amine derivatives under optimized reaction conditions. The influence of substituent effects, solvent polarity, and reaction kinetics on ligand formation was systematically explored. The synthesized ligands exhibit tunable donor properties and structural rigidity, making them promising candidates for transition metal coordination.

Keywords: Unsymmetrical Schiff base, Redox properties, mimic molecules, Cyclic voltammetry, molecular docking.



Unveiling Oceanic Bioactives: Sustainable Extraction and Biological Insights of Phlorotannins from Brown Seaweed

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Abstract: Phlorotannins are a unique class of polyphenolic compounds found in brown seaweed, exhibiting diverse bioactive properties. These marine derived secondary metabolites possess strong antioxidant, anti-inflammatory, anti-microbial and anti-cancer activities, making them valuable for pharmaceutical, nutraceutical, and cosmetic application. This study focuses on the extraction, quantification, characterization, and anti-microbial assessment of phlorotannins from brown seaweed species. Phlorotannins were extracted using solid-liquid extraction in the presence of ascorbic acid, which was extracted from orange peel to avoid oxidation, takes place in phlorotannin. Phytochemical analysis of the extract was carried out to identify the presence of phlorotannin. Structural characterization was performed by using UV-Visible Spectra, IR Spectra, and then the content of phlorotannin was quantified by using the Folin-Ciocalteu method. The antimicrobial activity of the ethanolic extract was evaluated against two gram-positive and two gram-negative bacteria using the disk diffusion method. The results demonstrated significant antimicrobial potential, suggesting the application of phlorotannins as natural bioactive agents in pharmaceuticals and food preservation. This study highlights the potential of brown seaweed-derived phlorotannins as sustainable and effective antimicrobial compounds

Keywords: Brown Seaweed, Phlorotannin, Solid-Liquid extraction, Folin-Ciocalteu, Anti-microbial activity



Synthesis, structural characterizations, and antibacterial studies of (E)-N'-(4-oxo-4-phenylbutan-2-ylidene)

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Abstract: A Schiff base compound, (E)-N'-(4-oxo-4-phenylbutan-2-ylidene) nicotine hydrazide, was synthesized through the condensation of nicotinic hydrazide with 1-phenylbutane-1,3-dione in methanol under reflux at 60°C. The synthesized compound was fully characterized using various spectroscopic techniques, including UV-visible, infrared (IR), nuclear magnetic resonance (NMR), and gas chromatography-mass spectrometry (GC-MS) analyses. The presence of keto-enol tautomerism and azomethine (-C=N-NH) functionality enhances electron delocalization, which plays a crucial role in the compound's biological activity. The antibacterial potential of the Schiff base was evaluated using the agar well diffusion method against *Escherichia coli* and *Staphylococcus aureus* at varying concentrations (25 µL, 50 µL, 75 µL, and 100 µL). The results demonstrated notable antibacterial activity against both bacterial strains, with a more pronounced inhibitory effect observed against the Gram-positive strain *S. aureus*.

Keywords: Schiff base, hydrazides, ligand synthesis, UV-Vis, NMR, GC-MS, antibacterial activity.

A novel synthesized and characterization of Cu-MOF (metal-organic framework) incorporated with Al₂O₃ nanoparticles as an electrochemical behaviour of corrosion inhibitor on mild steel in highly aggressive environment

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Abstract: This study explores the potential of Copper (Cu) metal-organic framework (MOF) functionalized with alumina (Al₂O₃) nanoparticles as an effective corrosion inhibitor for mildsteel. The synthesised composite material was confirmed by Fourier TransformInfraredSpectroscopy (FTIR), X-ray Diffraction (XRD), and Scanning Electron Microscopy (SEM). FTIR analysis confirmed the successful functionalization of Cu-MOF-Al₂O₃, indicatingthepresence of key functional groups associated with corrosion inhibition. XRD results showed the crystalline nature of the Cu-MOF-Al₂O₃ nanoparticles, supporting their stabilityanduniformity. SEM analysis revealed that the morphology and dispersion of the nanoparticles. The corrosion inhibition behaviour of the Cu-MOF-Al₂O₃ composite was assessedinacorrosive medium, revealing significant improvement in the corrosion resistance of mildsteel compared to untreated samples. The findings suggest that Cu-MOF functionalizedAl₂O₃nanoparticles can serve as a highly effective and sustainable corrosion inhibitor for mildsteel in aggressive environments.

Keywords: Metal-organic framework, Nano particles, Corrosion inhibitor, Mild steel, FT-IR, XRD, SEM



Nanoparticles embedded into metal organic frame work (ZrO₂/Zn²⁺+HoBt) as corrosion inhibitor on mild steel at low pH medium

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Abstract: The synthesized ZrO₂/Zn²⁺-HoBt composite were coated on the mild steel to determine the rate of corrosion in low pH medium. The synthesised of ZrO₂/Zn²⁺-HoBt composite were characterised using X-Ray diffraction (XRD), Fourier transform infrared (FT-IR), Scanning electron microscopy (SEM). The assessment of corrosion efficiency of inhibitor composite by gravimetric method, electrochemical impedance spectroscopy (EIS), potentiodynamic polarization (PDP) and bode plot. Further, from the assessment that (ZrO₂/Zn²⁺-HoBt) composite exhibit as good corrosion protection on mild steel at low pH medium. The synthesized (ZrO₂/Zn²⁺-HoBt) composite were targeted on industrial application such as cleaning industrial machinery parts, petroleum pipelines, acid pickling, descaling, automotive industries and etc.

Keywords: ZrO₂/Zn²⁺-HoBt composite, Corrosion inhibitor, Mild steel, FT-IR, XRD, SEM



CH-27

Fabrication and Characterization of MXene-Based Photocatalysts for Enhanced RhB Dye Degradation

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Abstract: Removing heavy metals, microbial contaminants and persistent organic pollutants from water sources requires efficient water treatment methods. Photocatalysis has emerged as a promising technology for water purification, harnessing light energy to drive pollutant degradation without harmful byproducts. However, issues including low efficiency, limited light absorption and poor recyclability have hindered the widespread application of photocatalysts. Among the most efficient photocatalysts for water treatment are MXenes, a type of two-dimensional (2D) transition metal carbides, nitrides, and carbonitrides. MXene's unique structure, high conductivity and tunable surface chemistry enable efficient light utilization and enhanced generation of reactive oxygen species, resulting in superior degradation of organic pollutants and pathogens. The synthesis, characterizations, and photocatalytic water treatment of RhB dye using MXene nanostructures are investigated in the current work. MXene is synthesized by mild etching using Lithium fluoride and HCl. The X-ray diffraction pattern shows (002) peak at 5.9° which confirms the presence of layered MXene nanostructures. MXene exhibits strong absorption peak at 272 nm. The surface and internal morphology was studied using Field emission scanning microscopy and Transmission electron microscopy. MXene degrades RhB completely in 120 min of irradiation under UV light.

Keywords: heavy metals, MXenes, RhB, Field emission scanning microscopy; Transmission electron microscopy

The Development of pH Responsive Oil Sorbers Using Long Chain Poly Alkyl Acrylates *via* LRP

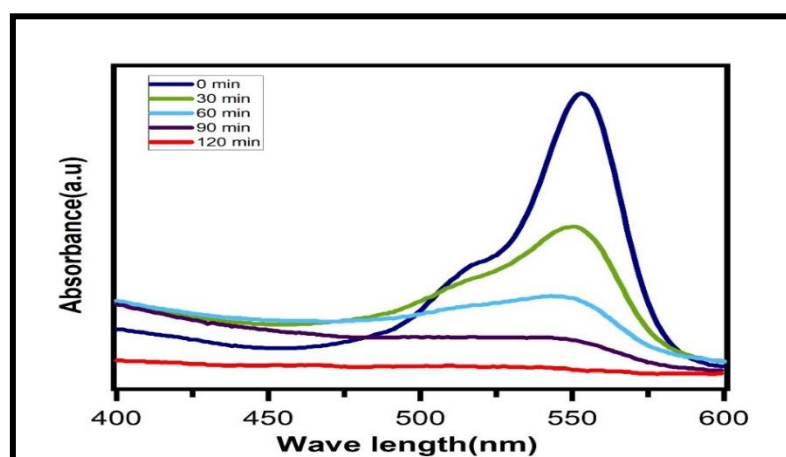
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Abstract: Well-defined oil-absorption material was successfully synthesized via living radical polymerization (LRP) on the surface of poly lauryl methacrylate utilizing hydrophilic groups as monomers, Copper (0)/pentamethyldiethylenetriamine as catalyst system. The polymerization proceeded in a “living” manner as indicated by linearity kinetic plot of the polymerization. Plots of $\ln([M]_0/[M])$ versus time and plots of the molecular weight versus conversion showed a linear dependence, indicating a constant number of propagating species throughout the polymerization. The chemical structure of sorbent was determined by FT-IR spectrometry and in addition TGA, GPC and ¹H NMR provide additional evidence for the formation of the block copolymer. The oil-absorption sorber shows a higher absorption capacity especially for trichloroethylene compared to other organic solvents. The sorber also possesses a thermo responsive behaviour at both 25 °C and 55 °C.



Keywords: Oil sorbers, Amphiphilic copolymers, Living radical polymerization, Super adsorbent, Thermoresponsive polymers





Design, Spectral Insights, and Bioactivity of Novel Zinc and Ruthenium Complexes with a Pyridinyl Schiff Base: A Step towards Multifunctional Therapeutics

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Abstract: In the present study, we have synthesized a Schiff base ligand called (Z)-2-methoxy-6-(1-((3-methylpyridin-2-yl) imino) ethyl) phenol via a condensation reaction with 2-hydroxy-3-methoxybenzaldehyde and 2-amino-3-picoline. The synthesised ligand was then taken in anequimolar concentration to prepare zinc (II) and ruthenium (II) metal complexes. Characterization techniques like thermogravimetric analysis, FTIR spectroscopy, UV-Visible spectrophotometry and ¹H NMR have been undergone to confirm the structures of the ligand and its metal complexes. Antibacterial activity tests against gram-positive and gram-negative bacteria help to understand the superior antibacterial efficacy of metal complexes and their corresponding free ligands against Bacillus subtilis and Escherichia coli. Further this activity provides increased lipophilicity and the chelation effect by improving membrane penetration. The tailored Schiff base metal complexes can enhance the potential of Schiff base metal complexes as promising antibacterial agents.

Keywords: Schiff base, Synthesis, Characterization, Biological activity.



AIE Active Pyrene-Naphthalene Schiff Base for Selective Detection of Explosive and Biological Applications

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Abstract: Recently, researchers have focused on developing a new molecular architecture by integrating rigid and extended pi-conjugation molecules for future applications. Smart functional materials with appealing optical features are essential because of their wide range of applications in sensor and forensic science. A new pyrene-naphthalene-based Schiff base ligand, PSB was developed by a simple condensation method of 2-hydroxy-1-naphthaldehyde and 1 aminopyrene. The ligand PSB was thoroughly characterized by pivotal techniques such as NMR, FT-IR, HR-MS, and elemental analysis. The developed PSB exhibit an excellent AIE property in THF: water (10:90) ratio. The aggregates were successfully used to detect picric acid in an aqueous media using a fluorescence probe. The low detection limit demonstrated the probe's remarkable sensitivity and selectivity towards picric acid. The mechanism of interaction between the PSB and bovine serum albumin (BSA) was examined by fluorescence emission spectra. The results indicated that the fluorescence intensity of BSA was decreased considerably upon the addition of the complexes through a static quenching mechanism with the formation of one binding site. The Stern-Volmer constant, mode of binding and binding constant were computed. The obtained results were further confirmed by using molecular docking analysis.

Keywords: Pyrene-Naphthalene Schiff base, Fluorescence quenching, Sensor, BSA binding, Molecular Docking.

Stripping analysis of Pb^{2+} and Hg^{2+} in deveined shrimp and eggshells using a H_2 bpabza/MWCNT– modified graphite electrode

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Abstract: A novel synthesis was performed of asymmetrical carboxamide ligand N,N'-bis(2-Pyridinecarboxamide)-2-aminobenzylamine (H_2 bpabza) derived from 2-pyridinecarboxylic acid and 2-aminobenzylamine. The N,N'-bis(2-pyridinecarboxamide)-2-aminobenzylamine (H_2 bpabza) ligand was confirmed by ultraviolet Visible (UV-Vis), Fourier transform infrared (FT-IR), and Raman spectroscopy. The fabrication of N,N'-bis(2-pyridinecarboxamide)-2-aminobenzylamine (H_2 bpabza) embedded in a multi-walled carbon nanotube (MWCNT)-modified graphite electrode (GE) for use as an electrochemical sensor of Pb^{2+} and Hg^{2+} was demonstrated. The performance of the H_2 bpabza/MWCNT electrode and (Pb^{2+} and Hg^{2+} – (H_2 bpabza)/MWCNT) was investigated by scanning electron microscopy (SEM) and square wave anodic stripping voltammetry (SWASV). In comparison to the MWCNT electrode, the H_2 bpabza/MWCNT electrode exhibited higher sensitivity and conductivity, as determined by cyclic Voltammetry (CV) and electrochemical impedance spectroscopy (EIS). Stripping analysis and detailed experiments were conducted to establish the optimal parameters for deposition and stripping of metal ions, such as supporting electrolytes, pH, and accumulation time. The linear range was 2 to 140 $mg L^{-1}$, with a detection limit of 0.1 $mg L^{-1}$ for Pb^{2+} and 0.3 $mg L^{-1}$ for Hg^{2+} ($S/N = 3$). The H_2 bpabza/MWCNT-modified GE showed excellent sensitivity, selectivity, stability, and reproducibility for the determination of Pb^{2+} and Hg^{2+} . Ultimately, the H_2 bpabza/MWCNT-modified GE was used to demonstrate the electrochemical sensing of Pb^{2+} and Hg^{2+} in deveined shrimp and eggshells.

Keywords: H_2 bpabza, UV-Vis, FT-IR, sensitivity.



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Interpreting Stories – Analysing Multi-Adaptation in the Sandman

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Abstract: Neil Gaiman's *The Sandman* is a classic work that reinterprets several literary and mythological traditions through adaptation. This study examines *The Sandman* as an example of multi-adaptation, wherein Gaiman reworks canonical works like Shakespeare's *A Midsummer Night's Dream*, Milton's *Paradise Lost*, Greek and Norse mythology, and Arabian folklore into a contemporary graphic novel. Incorporating Linda Hutcheon's "A Theory of Adaptation", this study analysis how *The Sandman* does not simply allude to these texts but actually reworks them in its universe, creating new mythos through visual narrative. The study also extends to Netflix's live-action adaptation by emphasising visual storytelling which is an adaptation of Gaiman's adaptations, adding another level of transformation. This research examines how narrative elements thematic content, and reception changes when moving between the major issues found in the graphic novel (*A Midsummer Night's Dream*, *Season of Mists*, *The Kindly Ones*, *Ramadan*, and *The Sandman: Overture*) with the corresponding episodes in the Netflix series. The study emphasises the fluid nature of adaptation as it counters the conventional fidelity debate by prioritizing creative reworking over textual fidelity. Ultimately, this research situates *The Sandman* within adaptation studies, illustrating that it is an active, transformative text that continually reimagines narrative through varying forms of media.

Keywords: Multi-adaptation, Reinterpretation, Graphic Novel, Narrative, Myth, Media



EN-02

Innovative Teaching Approach: An Approach to Develop Speaking Skills in English of Engineering Students Leads to Effective Communication Skills

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Abstract: Communication can be defined as the exchange of information, ideas and knowledge between a sender and a receiver through an accepted code of symbols. Effective communication takes place in a well-defined set-up. A classroom is the communication environment when a teacher delivers lectures to students. Students are expecting an educational system that works for and with them. The teaching-learning process is shifted from teacher-centered to student-centered through innovative teaching-learning techniques. With the advancement of technology and globalization-communication skills in English language, as a life-long learning skill is an essential component in engineering education as an employability skill. Communication is one of 11 key outcomes designed by Accreditation Board for Engineering and Technology (ABET). Listening, speaking, reading and writing (LSRW) are considered as four basic language skills, contributed major role in developing communication skills in English language. Though all skills are equally important, Speaking is the stepping stone in verbal communication yet difficult to acquire without knowledge or mastery on the remaining three skills. Currently teaching-learning process is shifted from chalk and talk to the implementation of various approaches based on cooperative and collaborative learning and integration of Information and Communication Technology in English Proficiency class. Some effective approaches are computer assisted language learning, mobile assisted language learning, technology enabled language learning, project based, problem based & activity-based language learning, role play and flipped classroom-based language learning. The purpose of the present paper is to explore the effective implementation of Innovative teaching approach in English language classroom to develop speaking skills of Sethu Institute of Technology students with other 21st century life skills by implementing various Activity based activities as per need analysis of learners in order to ensure their active participation.

Keywords: Communication skills; Task based approach; Speaking skills; Innovative Teaching Approach



EN-03

A Study Of Indian Hijra Autobiographies: Wounds Become Voice

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Abstract: Indian transgender people are sometimes referred to as hijras, and they are the most ignored, ostracized, and mistreated group in India. Social invisibility is a problem for all Hijras. According to the legislation, Third Gender, Hijras are the tradition bearers, and transgender is the umbrella word that encompasses all of these manifestations. This population is among the most stigmatized and disempowered in Indian culture because to the several forms of discrimination they face because of their gender abnormality and class. Despite growing knowledge and goodwill, Hijras in Indian society continue to endure discrimination and atrocities. Without the backing of the family, society, and government, hijras find that their basic life on this planet is in doubt. An analysis of autobiographies authored by Hijras highlights important concerns regarding the position of transgender people in India. In addition to documenting memories and experiences, these memoirs also document the shared predicament of several Hijras, including their identity crisis and fight for existence. The autobiographies of Revathi, Laxmi, and Vidya are used in this study to highlight the pitiful situation of hijras. The goal of this study is to provide some insight into how the traumatic experiences of hijras impact their life. The topic of transgender people's integration into society remains unsettled. The purpose of this study is to highlight the stigmatizing consequences that society has on Hijras. The primary goal of this study is to explore the traumatic experiences of Hijras and to demonstrate the value of writing therapy as a means of overcoming trauma and redefining Hijra identity.

Keywords: Discrimination, Trauma, Transgender, Legistaltion.

**EN-04**

Interconnected Worlds: Relational Cosmologies and Environmental Ethics In Indigenous Literature

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Abstract: This paper explores the concept of relational cosmologies in contemporary Indigenous literature, focusing on Braiding Sweetgrass by Robin Wall Kimmerer, Indian Horse by Richard Wagamese, and Ceremony by Leslie Marmon Silko. Relational cosmology, an epistemological framework, emphasizes interconnectedness, reciprocity, and the agency of non-human entities, offering a perspective that challenges Western paradigms of anthropocentrism and ecological exploitation. The study argues that Indigenous literature articulates an environmental ethic rooted in relational ontology, where the land is viewed not as a mere resource but as a sentient and relational being. Through Indigenous ecological knowledge and storytelling, these works advocate for sustainability and serve as a resistance to colonial ecological destruction. The paper underscores the importance of integrating relational cosmologies into mainstream environmental discourse to address the ongoing global environmental crisis.

Keywords: Indigenous , Reinterpretation, Colonial, Narrative.

**EN-05**

Exploration of Cultural Ecology in Select Works of Julia Donaldson

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Abstract: This study examines select works by Julia Donaldson through a cultural ecology framework, exploring how these narratives reflect and shape cultural understandings of human-nature relationships. Focusing on stories that emphasize ecological themes of interconnectedness, respect for nature, and environmental care, this analysis reveals how Donaldson's narratives, while often not explicitly environmental, engage with ecological concepts in subtle yet impactful ways. The study examines instances of interdependence within fictional ecosystems, such as the food chain dynamics subtly present in *The Gruffalo*, as well as narratives promoting harmonious coexistence with nature, as exemplified in *A Squash and a Squeeze*. Further, the analysis considers how stories like *The Paper Dolls* can inspire reflection on consumption and waste, thereby fostering a sense of environmental responsibility. By examining these select works, the research aims to demonstrate the potential of Donaldson's oeuvre to contribute to broader cultural conversations about ecological awareness and sustainability. This study ultimately contributes to a deeper understanding of how children's literature can subtly introduce complex environmental themes and foster an ecological consciousness in young audiences.

Keywords: Julia Donaldson, Children's Literature, Cultural Ecology, Human-nature Relationships, Eco-narratives

EN-06

Reconceptualizing English Language Instruction: The Impact of ICT on the Future of Education

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Abstract: Modern pedagogy has been transformed by the incorporation of Information and Communication Technology (ICT) into English Language Teaching (ELT). This research looks at how ICT tools are currently used in ELT, stressing their advantages, disadvantages, and room for development. Despite disparities in educational attainment throughout the world, the use of ICT tools in ELT has grown in popularity due to both shifting student needs and technical improvements. This study uses a mixed-methods approach, integrating quantitative and qualitative surveys, interviews, and other approaches to examine how ICT tools affect English language education. Finding trends, difficulties, and possibilities in the use of ICT tools in ESL classes is the main goal. The study's conclusions and suggestions. Students, instructors, administrators, and other ELT stakeholders will all benefit greatly from the study's conclusions and suggestions. Additionally, this study will open the door for additional research on ICT integration in comparable educational settings, which will eventually improve the standard of English language training. In order to give a thorough knowledge of ICT integration in English Language Teaching (ELT), this study takes a novel method by integrating qualitative and quantitative approaches. Surveys, questionnaires, and observations are used in the data gathering process, which produces a robust and varied dataset. The researcher obtains a nuanced and comprehensive study by combining many approaches, covering a range of perspectives and illuminating the intricate phenomena of ICT integration in ELT.

Keywords: Mixed approaches, ICT, Pedagogy, technology.

**EN-07**

Generational Trauma and the Diasporic Experience: A Study of Cultural Conflicts In Chitra Banerjee Divakaruni'S The Mistress Of Spices And Arranged Marriage

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Abstract: This article explores the theme of generational trauma in Chitra Banerjee Divakaruni's *The Mistress of Spices* and selected stories from *Arranged Marriage*. By exploring the interplay between cultural displacement, patriarchal norms, and familial expectations, the study uncovers how psychological scars are transmitted across generations within immigrant families. Utilizing an interdisciplinary theoretical framework that integrates diasporic studies, trauma theory, and feminist criticism, the analysis highlights the fragmented narratives and suppressed emotions that define the experiences of Divakaruni's characters. The article also investigates how the cyclical nature of trauma is intricately linked to broader socio-cultural structures and historical legacies of colonization. Finally, it emphasizes Divakaruni's portrayal of resilience, cultural hybridity, and reconciliation as transformative strategies for breaking intergenerational cycles of suffering, ultimately offering a hopeful narrative of healing and empowerment within the diaspora.

Keywords: Generational Trauma, Diaspora, Cultural Displacement, Feminist Criticism, Cultural Reconciliation

EN-08

When A City Becomes A Character: A Survey Of Select Mumbai Films.

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Abstract: This paper explores the dynamic interplay between urban spaces and cinematic storytelling, focusing on Mumbai as a character in three films: *Satya* (1998), *Dhobi Ghat* (2010), and *All We Imagine as Light* (2024). Utilizing theoretical frameworks such as Lefebvre's Production of Space, Deleuze's Time-Image, and Postcolonial Urban Studies, the study examines how Mumbai transforms from a mere setting into an active, anthropomorphized participant in the narrative. The analysis traces the evolving depiction of Mumbai's socio-economic landscape, personal histories, and cultural plurality. *Satya*, through its gritty portrayal of the underworld, reflects the darker undercurrents of globalization and urban alienation. *Dhobi Ghat*, in its lyrical episodic structure, reveals the city as a canvas of fragmented stories, reflecting a fluid, multi-dimensional Mumbai. Meanwhile, *All We Imagine as Light* takes a postmodern approach, engaging with the city's existential and aesthetic dimensions, where spaces embody the inner turmoil and aspirations of its characters. By bridging cinematic theory with urban sociology, this research underscores how Mumbai's spatiality informs identity, memory, and power structures. Through the comparative analysis of these films, the paper illuminates the ways in which cities, particularly postcolonial metropolises, become central to the construction of narrative and identity in contemporary cinema.

Keywords: Mumbai Films, Urban Space, Spatial Narratives, City, Indian Cinema

**EN-09**

Cartography and Collective Memory: Exploring the Role of Maps in Shaping History and Identity In The Book of Lost Things and The Name of The Wind

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Abstract: This paper applies Maurice Halbwachs Cartography and Memory Theory to explore how maps in literature serve as mnemonic devices that preserve and convey collective memories. Halbwachs argues that social structures and practices shape collective memory, and in literature, maps function as key tools for encoding shared histories, cultural identities, and past events. Focusing on *The Book of Lost Things* by John Connolly and *The Name of the Wind* by Patrick Rothfuss, this study examines how maps transcend their geographical function to reflect the collective memories of fictional worlds. In *The Book of Lost Things*, maps depict not only physical locations but also encapsulate lost histories and emotional milestones in the protagonist David's journey. These maps allow the reader to understand how geographical spaces carry the weight of memory, representing places tied to personal and collective experiences. Similarly, in *The Name of the Wind*, the maps of Kvothe's world function as tools for understanding the evolution of societies, histories, and power dynamics. The maps are integral to the characters' understanding of their identity and the historical narratives that shape their world. By analyzing these works through Halbwachs' lens, the paper shows that maps in literature preserve collective memory and help readers and characters understand the social, historical, and cultural frameworks of their worlds. Maps, thus, are not just representations of physical space, but also serve as repositories of shared memory, shaping characters' perceptions of their history and identity. This study highlights the significance of cartography in memory, history, and world-building within literary works.

Keywords: Mumbai Films, Urban Space, Spatial Narratives, City, Indian Cinema

EN-10

Echoes of Untouchability: The Osu in Igbo Society and Dalit Parallels in Achebe's No Longer at Ease.

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Abstract: This article examines Chinua Achebe's No Longer at Ease through the lens of social stratification, focusing on the persistent marginalization of the Osu community within Igbo society. Despite the influence of Christianity and the promise of modernization, the Osu continue to face systemic discrimination, a reality that echoes the struggles of the Dalit community in India. By drawing a parallel between these two groups, this study explores the intersections of caste, conversion, and social mobility, highlighting the shared experiences of oppression and social exclusion. The analysis reveals how entrenched cultural stigmas withstand religious and social reforms, questioning the effectiveness of modernity in eradicating deep-rooted prejudices. Through a comparative framework, the article underscores the universality of caste-like discrimination and its impact on personal and collective identities. Achebe's portrayal of the Osu serves as a powerful reminder of the enduring nature of societal hierarchies, sparking a broader conversation on the resilience of untouchability across different cultures and contexts.

Keywords: Chinua Achebe, Osu community, Dalit oppression, Igbo society, Caste system, Social discrimination, Cultural stigmas, Untouchability

**EN-11**

Echoes of Migration in Contemporary Literature: Diasporic Narratives in Divakaruni's "The Vine of Desire" and Manju Kapur's "The immigrant"

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Abstract: This article examines Chinua Achebe's *No Longer at Ease* through the lens of social stratification, focusing on the persistent marginalization of the Osu community within Igbo society. Despite the influence of Christianity and the promise of modernization, the Osu continue to face systemic discrimination, a reality that echoes the struggles of the Dalit community in India. By drawing a parallel between these two groups, this study explores the intersections of caste, conversion, and social mobility, highlighting the shared experiences of oppression and social exclusion. The analysis reveals how entrenched cultural stigmas withstand religious and social reforms, questioning the effectiveness of modernity in eradicating deep-rooted prejudices. Through a comparative framework, the article underscores the universality of caste-like discrimination and its impact on personal and collective identities. Achebe's portrayal of the Osu serves as a powerful reminder of the enduring nature of societal hierarchies, sparking a broader conversation on the resilience of untouchability.

Keywords: Chinua Achebe, Community, Dalit Opperssion, Society, Caste system.

**EN-12**

Conception Of Women In R.K Narayan’S The Dark Room

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Abstract: R. K. Narayan’s *The Dark Room* beautifully presents a fascinating portrayal of Savitri, a character torn between traditional values and feminist aspirations, emphasizing the struggle of Indian women in the 1930s. Savitri’s journey summarizes the plight of Indian women navigating the cruel and oppressive patriarchal structures, as her rebellion against her husband Ramani’s infidelity is juxtaposed with her ultimate return to the confines of dark familial structure. The novel’s conclusion, while often criticized, is argued to authentically represent the constraints faced by Indian women bound by familial and societal obligations. Narayan’s depiction of Savitri draws comparisons with other literary figures like Nora from Ibsen’s *A Doll’s House* and Gauri from Mulk Raj Anand’s *Gauri*, revealing divergent feminist trajectories. Furthermore, the study parallels *The Dark Room* with Kalki’s *Thiagarbhoomi* by contrasting feminist perspectives within the Indian literary tradition. While Narayan’s resolution lacks the bold confrontation seen in other narratives, Savitri’s actions mark a remarkable, albeit hesitant, step toward women’s liberation. By and large, *The Dark Room* challenges the rigidity of traditional values and offers a pitiful and poignant exploration of gender, individual agency, and societal expectations.

Keywords: Women’s Liberation, Feminist Perspective, Patriarchy, Traditional values



EN-13

Green Utopia or Dystopia: An Ecological Interpretation of Ursula K. Le Guin's *The Ones Who Walk Away from Omelas*

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Abstract: Ecocriticism has become one of the forerunners in today's literary theoretical scene. The destruction of nature plagues humans who are directly or indirectly affected by it. Ursula K. Le Guin was born in 1929. She is renowned for her contributions to the genre of science fiction. Her unshakable hold over the genre has led to the creation of many masterpieces. Her famous short story, *The Ones Who Walk Away from Omelas* was published in 1973. The impact of the story led to its reception of numerous laurels including the Hugo Award for Best Short Story (1974) and its nomination for the prestigious Locus Award for Best Short Fiction (1974). The story is set in an utopian city, Omelas where the citizens live a perfect and happy life. Ironically, the happiness of the people is derived from the utter misery of a young child. The story explores this society's ideals and the humaneness of its citizens. This research paper aims to reinterpret the utopian world through the lens of ecocriticism with respect to the environmental challenges faced on earth.

Keywords: Ecology, Utopia, Dystopia, Ecocriticism



EN-14

Challenging the Image of Asexual Mothers: Representation of Mothers as Sexual Beings in Salma's *The Hour Past Midnight* and K. R. Meera's *The Poison of Love*

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Abstract: The words associated with “mother” often include care, nurture, sacred, and sacrifice. It is unlikely that “mother” exists alongside other terms such as desire and sexuality. The two images established by the Western Christian world to perpetuate the ideas of chastity and morality are the Madonna and the whore. While the Madonna is an example of everything virtuous, sacrificial, and chaste, the whore represents the evils of acting upon one’s desire and lust. This patriarchal ideology of presenting mothers as the beneficiaries of good and moral behaviour encourages and enforces women to keep away from their needs and desires. The aim of this paper is to investigate how contemporary authors Salma and K. R. Meera presents sexually desiring mothers in their literature. Rooted in their socioeconomic and religious background, mothers in Salma and Meera’s novels range from enablers of female misogyny and patriarchy to agents of change and dissent. The paper will explore the expressions of desire by these mothers and the relationship they have with their desiring and desirable daughters. Drawing upon the theories of Adrienne Rich, Andrea O’ Reilly, Julia Kristeva and Nancy Tuana, the paper will analyse how Salma and Meera’s portrayals of desiring mothers are away from the stereotypical notions of motherhood.

Keywords: motherhood, desire, sexuality, patriarchy, female agency



EN-15

Behind the Moustache: Uncovering the Complexity of Poirot's Character in 'Death on the Nile'

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Abstract: Hercule Poirot is a renowned Belgian detective on Agatha Christie's 'Death on The Nile' novel. He is a protagonist and well knowledgeable person about crime and psychology of human nature. His physical appearance and personality is still a inspiration and the intelligence of complex crime with suspense cracking will last till the end of the novel. The investigation techniques and methods will be a game changer of the crime to solve it efficiently with all the evidences from the characters in the novel. Linnet Ridgeway and Simon Doyle will play a major role who are husband and wife. Linnet seeks help from Poirot after stalking by her oldest friend Jacqueline De Bellefort. Whereas, Miss. Bowers a Linnet's maid will be providing Poirot with valuable insights. The murder will be takes place while Poirot is on the board. Poirot uses psychological tricks to identify the murderer and helps the victims to get justice for there blood sheds. Poirot's observation on the characters will be clear to the core in the novel 'Death on The Nile'

Key Words: Murder, Crime, Justice, Poirot, psychology



EN-16

Colonial Ethics Unraveled: A Study of Moral Complexity in Kate Grenville'S *Trilogy*

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Abstract: The present paper attempts to examine how individuals make significant decisions that have unfavorable results that are morally grey. People are more complex than simply heroes or villains, as they are shaped by their environment, Personal Prejudices, and the backdrop of history. Kate Grenville is one of the most eminent and celebrated names in Australian Literature that has shaded Australia's Colonial period in all its brutalities. Her novels present different aspects of Colonialism, Identity, and moral dilemma confronted by individuals during a period of significant turmoil and conflict.

The never- ending moral conflicts posed by clashing concepts are brought to light in the colonial trilogy- *The Secret River*, *The Lieutenant*, and *Sarah Thornhill*. The settlement period gave rise to deeply rooted dominance over Indigenous people that justified their actions in trying to acquire land and other resources. The characters of Grenville portray the moral paradoxes in a Colonial World and the moral ambiguities of Colonialism. These novels ultimately fit into an ethical framework, though they incorporate elements of various ideologies as well.

Keywords: *Colonialism, Identity, Conflict, Dominance, Ambiguity*

AI vs. Humanity: Ethical Implications of Artificial Intelligence in ‘Enthiran’ through the Lens of AI Ethics Theory

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Abstract: This research examines the appealing narratives of Yeonmi Park, Hyeonsoo Lee, and Suki Kim, with a definite focus on how their literary works shed light on the irreplaceable experiences of gender-based subjugation and emancipation. Yeonmi Park's memoir, *In Order to Live*, deals with a narrative of her journey to freedom from North Korea which focuses on the life-threatening illustrations of cruelty against women and the trafficking of human beings that she experienced. In *The Girl with Seven Names*, Hyeonsoo Lee, the author probes into the complex nature of identity and the struggle for survival. It describes the distinctive hindrances met by female defectors, such as the universal hazard of being broken and the hard pursuit of reunifying with their families. Suki Kim's novel, *The Interpreter* focuses on the themes of cultural dislocation and gender dynamics among Korean-American immigrant groups, thus improving the prevailing accounts on this topic. These works deliver a wide-ranging standpoint on the numerous features of freedom, flexibility, and identity that are inclined by gender. It offers how Park, Lee, and Kim portray the broader socio-political atmospheres of North Korea and the settler expedition through personal narratives and creative works, improving the understanding of gender in the detection of freedom.

Keywords: defector, gender, struggle, survival.



EN-18

Double Subjugation in Imayam's *The Beast of Burden*

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Abstract: Imayam is a prominent writer who narrates the contemporary social and economic conflicts in the society. His works concentrate on caste, honour-killing, inter and caste discrimination, violence and dominance on women. Imayam's *The Beast of Burden* is the portrayal of subjugation of Dalit people by the upper layer of Dalit community people. The aim of this research article is to bring out the double oppression experienced by the Vannar community people into light. The center of the research is to uncover how the Vannar caste is repressed by the people of their own caste. An analysis on the social and economic struggle faced by the protagonist Arokkyam, a Vannathi widow woman is the vital focus of this article. The tireless hardship of Arokkyam to raise her three children and safeguard her family is illustrated by the novelist Imayam. He has showcased how Arokkyam struggles to protect her family and keep her family united amidst the caste and identity issues. The Intra-caste suppression faced by Arokkyam, her family and Vannar community people is explored in detail. The research article exemplifies how lower caste women are harassed by the male dominant society.

Keywords: Caste, Suppression, Women Oppression, Intra-caste repression and Social and Economic struggle



EN-19

“Tigers, Tides, and Testimonies: Voices of Nonhuman Agency in Amitav Ghosh's *The Hungry Tide*”

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Abstract: Amitav Ghosh's prominent novel 'The Hungry Tide' based on the Sundarban islands, weaves eloquently the relationship between human and nature. It depicts the agency of nonhuman agents in this postcolonial world. The novel debunks anthropocentric thinking by articulating the marginalized agency of nature in the dynamic relationship of tides and existence of animals like Bengal tigers. This research paper deals with the subject of power relations and environmental morality in the context of competing human and nonhuman species claims to existence. It seeks to explore the multiple layers of nonhuman agency in *The Hungry Tide* and how the novel ascribes agency to nature specifically the tides and tigers. These agencies manipulate narrative and countermand anthropocentric understandings. The aim is to examine his approach in describing the ecosystem as an active agent in the narrative and shaping human lives. It reveals Eco social, ecopolitical concerns and close reading of textual examination to identify. To investigate moments in which nonhuman entities have power and influence on the narrative. The analysis brings out that Ghosh successfully personifies the Sundarbans as an active player, with tides and tigers having extensive control over the lives of people and dictating the story. The representation of tigers lays stress on human-wildlife conflict whereas the tides represent the inescapable change and the power of nature.

The structural organization of the novel, mainly the interpenetration of the human and the nonhuman eye, highlights the interconnectedness of all living forms within the world. This novel is a powerful discourse of nonhuman agency undermining anthropocentric visions and fostering an ecologically aware worldview. In voicing out the tides and tigers, he emphasizes the necessity of understanding the agency. The worth of nonhuman beings in terms of environmental ethics, justice and sustainability. It enhances our understanding of the ecocritical nature of the novel and its significance for current environmental consciousness.

Keywords: Nonhuman Agency, The Hungry Tide, Amitav Ghosh, Ecocriticism, Stylistics, Sundarbans, Tigers, Tides, Environmental Ethics.



EN-20

Interfacing Fact and Fiction: The Titanic Disaster and the World War I in Danielle Steel's *A Good Woman*

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Abstract: Danielle Steel's *A Good Woman* (2008) blends history and fiction, following Annabelle Worthington as she navigates personal loss and global upheaval, shaping her journey of resilience and self-discovery. The novel begins with the Titanic disaster in 1912, which shatters Annabelle's privileged life. Propelled to rebuild, Annabelle relocates to France during World War I, embracing a new role in the medical field. This paper examines how Steel merges historical events with fiction to craft a narrative of female empowerment. Analysing her depiction of the Titanic disaster and World War I, this study assesses the novel's historical authenticity, embellishment of real events, and the impact of intertwining fact with fiction. By blending historical tragedies with personal struggles, Steel reimagines women's agency within restrictive social structures. Using feminist literary criticism, particularly Simone de Beauvoir's theories from *The Second Sex* (1949), this study explores how Steel challenges traditional gender roles. Annabelle defies societal norms, symbolizing the evolving role of women in historical fiction. Applying Linda Hutcheon's concept of historiographic metafiction, this study examines how Steel reshapes history by merging fact with narrative invention. Ultimately, it highlights how popular historical fiction redefines historical discourse through the lens of gender and social transformation.

Keywords: historiographic meta fiction, Titanic disaster, World War I, female empowerment, Simon de Beauvoir.



EN-21

Climate Refugees in Literature: A Study of Displacement in the Works of Richard Powers and Kim Stanley Robinson

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Abstract: People live in a time of climate change and global warming which makes everyone scatter from their land, family and culture. While navigating through those difficult times of climate change, people tend to lose their identity. What is interesting is that climate change-induced displacement is a pressing global crisis, yet it remains underrepresented in legal frameworks and policy discussions. The leader's policies and people's contribution towards climate change can no longer stop the climate refugees. Climate change is the prior cause of climate refugees where humans are not the only species that are vulnerable to disruption but also every scale from polar bears to microscopic organisms. This paper explores the concept of climate refugees, and cultural loss and traumas through the lens of literature, specifically analyzing Richard Powers' (2018) Kim Stanley Robinson's *New York 2140* (2017), and *The Ministry for the Future* (2020). By applying climate justice theory, this paper parallels between fictional and real-world climate-induced migration, and it examines the socio-political, ethical, and environmental dimensions of climate displacement in literary narratives.

Keywords: Climate change, Climate Refugees, Displacement, Global, Crisis.



EN-22

The Digitalization of Knowledge and Cultural Memory in Vernor Vinge's *Rainbows End*

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Abstract: In *Rainbows End* by Vernor Vinge, the digitalization and archiving of the world reshape society, as traditional forms of knowledge preservation give way to immersive, corporate-controlled digital networks. Set in a near-future where libraries and physical books are systematically dismantled in favor of digital archives, the novel explores the ethical and cultural consequences of this transformation. Knowledge is accessed through augmented reality, redefining literacy and creating generational divides between those who embrace digital media and those who mourn the loss of tangible books and artifacts. The corporate control of digital archives raises concerns over censorship, accessibility, and privacy, as personal and public information alike are vulnerable to manipulation. Vinge's narrative presents both the promise and peril of a digitalized world, questioning what is sacrificed when cultural memory is rendered intangible and commodified.

Keywords: Archiving, Digitalization, Augmented Reality, Knowledge Preservation, and Generational Divide



Probing ‘Playfulness’ in Gender Psyche: A Psychogeographical Reading of Urdu Short Fiction

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Abstract: The research paper will attempt to probe the ‘Playfulness’ exhibited by roles that gender take up in selected geographical locations by tracing the psyche of men and women through select literary translations of Urdu short fictions. The research paper would analyse the issue of women exhibiting ‘Playfulness’ in certain geographical locations whereas other locations seem to restrict them thus exhorting a gender role to the location. Relatively, men do not seem to exhibit restrictions in their psyche in similar locations where women exhibit a blockage. The concept of ‘Playfulness’ is governed by the critical framework of Psychogeography as explicated by Will Self in *Psychogeography* (2007). The research paper uses the concept of ‘Playfulness’ or ‘Drifting’ by psychogeographers like Will Self to explore the concept by convulsive substitution through extending its application thus not limiting it only to walking in an urban environment. The selected short fictions are from *The Greatest Urdu Stories Ever Told* (2017) translated into English from Urdu by Muhammad Umar Menon. Urdu literature provides scope for looking at a conservative culture, which is an assumption made by the writings of Zakia Mashhadi, Ismat Chughtai, Jamila Hashmi, Khalida Asghar, Altaf Fatima and few selected male writers for a comparison.

Keywords: Urdu Short Stories, Gender Studies, Psyche, Psychogeography

The Hero's Odyssey: Exploring Joseph Campbell's Hero's Journey in Hindi Movies Narratives

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Abstract: Joseph Campbell's Hero's Journey, a narrative framework outlined in *The Hero with a Thousand Faces*, has been a fundamental structure in storytelling across cultures. This paper explores how Campbell's monomyth manifests in Hindi cinema through an analysis of six Bollywood films: *Chandni Chowk to China*, *Baaghi*, *Sui Dhaaga*, *Brahmastra*, *Bajrangi Bhaijaan*, and *Gully Boy*. Each of these films presents a protagonist who embarks on a transformative journey, facing trials, mentorship, and self-realization before achieving their goal. The study examines how the Hero's Journey in Bollywood differs from Western interpretations by incorporating Indian cultural values, familial duty, and spiritual growth. It highlights Campbellian archetypes such as the mentor, the threshold guardian, and the supreme ordeal, demonstrating how these elements are adapted within the Indian socio-cultural framework. For instance, *Bajrangi Bhaijaan* portrays a hero's transformation through compassion and sacrifice, while *Gully Boy* reflects an inner journey of self-belief and ambition. *Brahmastra* reimagines the monomyth in a fantasy setting, integrating mythology with modern storytelling. Through these case studies, the paper explores recurring themes of destiny, resilience, and self-discovery, analyzing how Bollywood's storytelling techniques—song sequences and heightened emotions—shape the hero's evolution. The research also considers the impact of genre, from action-packed narratives (*Baaghi*, *Chandni Chowk to China*) to socially driven dramas (*Sui Dhaga*). By applying Campbell's framework to these films, this paper offers a deeper understanding of how Hindi cinema continues reinventing the Hero's Journey, making it relevant to contemporary audiences. The findings demonstrate the versatility of Campbell's theory and its ability to resonate within the unique cultural and cinematic traditions of Bollywood.

Keywords: Hero's Journey, Monomyth, Departure, initiations, Return, Hindi Movies

EN-25

Decolonizing Pedagogy by Re-educating the Canadian Metis using Graphic Novels- with Particular Reference from *A Girl Called Echo* by Katherena Vermette

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Abstract: The colonial history of Canada has left an indelible trauma on the Indigenous population and the Metis. This research paper focuses on the cognitive trauma caused to the Metis of Canada by the pedagogical tools of the colonizers in Canadian schools. This study examines graphic novels created by the Metis as a pedagogical tool that serves as a counter-narrative to dominant white historical accounts. This pedagogical tool fosters cultural understanding and historical awareness among the Metis youth. Visual and textual representations in the graphic novels are akin to the storytelling method of the Metis. Storytelling was the traditional pedagogical tool of the Metis where they educated the generations by passing on the stories; in the words on the colonizer, it is history. This research adapts theoretical methodology with the approach of Linda Tuhiwai Smith, who uses storytelling as one of the tools to decolonize the white narratives on the Metis. Katherena Vermette's graphic novel, *A Girl Called Echo* will be analyzed in detail to prove that re-educating the Canadian Metis using graphic novels as a pedagogical tool will aid the Metis youth in developing cultural and historical awareness.

Keywords: storytelling, graphic novels, pedagogical tools, re-educating, decolonizing.



Redefining Gender Roles in Rabindranath Tagore's *Chitra* and *The King and The Queen*

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Abstract: The aim of this paper is to examine the protagonists' political commitment towards their kingdom and people in Rabindranath Tagore's plays *Chitra* and *The King and the Queen*. *The King and the Queen* is a play written by Rabindranath Tagore, while *Chitra* is adapted from an episode in the Mahabharata. The protagonist of *Chitra* is Chitra, the princess of Manipur, while Sumitra is the central character in *The King and the Queen*. Both characters realize and embrace certain political commitments in different ways, though. Chitra, being the only heir to the throne since her father had no son, was raised as a ruler and protector of her kingdom. On the other hand, Sumitra, the queen, steps up to safeguard her people when her husband, King Vikram, prioritizes his love for her neglecting his duties as a King. This paper explores how, initially, Chitra is carried away by illusion but gradually realizes her responsibility towards her people. Through her interaction with Arjuna, she understands that beauty is temporary and not a virtue in itself. As a princess, her duty is to protect her kingdom rather than merely embodying celestial beauty. Similarly, Sumitra deeply loves her husband, but when he fails in his responsibilities as a king, she takes extreme steps to become a protector to save the people from starvation. Thus, both *Chitra* and *The King and the Queen* illustrate the protagonists' political commitment to their society, emphasizing the necessity of duty over personal desires.

Key words: Illusion, Identity, Realization, Gender role's Subversion

EN-27

From Struggle to Survival: Ecofeminism in the Diasporic voices of Dumas' *Funny in Farsi* and Thammavongsa's *How to Pronounce Knife*

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Abstract: Aesthetic Semantics is a term in linguistics with immense implications in Philosophy. Edmund Burke and Immanuel Kant have made significant contribution to interpreting aesthetics as beauty sensed through the meaning of words and their reflective applicability. Human beings start developing the habit of imagination and the creation of ideas about the objects both seen and unseen approximately between the ages of 2 and 10 years. Mythology gives a positive impetus in developing the child's creativity. Instead of merely describing the moon and its eclipse as cosmic figure and phenomenon, when it is described as the Goddess Selene, whom a monster slaughtered, the child becomes overexcited and interrogative to have more knowledge about the moon and other cosmic objects. Thus, a child becomes a philocalist and epistemophile without any burden. According to Plato, '...educating the young generation through the medium of myth is an ideal. When recommending the teaching of how things of the world came into being through myth, Plato referred to accounts that were considered reliable, to myths representing a particular category, the 'foundational myth' [*Republic*, 375 BCE] This article attempts to conceptualize the mechanism how mythology stimulates the human mind in generating aesthetic semantics, drawing illustrations from the Roman mythology.

Key words: Aesthetic semantics, cosmic figure and phenomenon, myth, impetus, epistemophele



EN-28

Exploring Women's Perspectives on Autonomy: Gender Study in the Select Works of North Korean Defectors

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Abstract: This research examines the appealing narratives of Yeonmi Park, Hyeonseo Lee, and Suki Kim, with a definite focus on how their literary works shed light on the irreplaceable experiences of gender-based subjugation and emancipation. Yeonmi Park's memoir, *In Order to Live*, deals with a narrative of her journey to freedom from North Korea which focuses on the life-threatening illustrations of cruelty against women and the trafficking of human beings that she experienced. In *The Girl with Seven Names*, Hyeonseo Lee, the author probes into the complex nature of identity and the struggle for survival. It describes the distinctive hindrances met by female defectors, such as the universal hazard of being broken and the hard pursuit of reunifying with their families. Suki Kim's novel, *The Interpreter* focuses on the themes of cultural dislocation and gender dynamics among Korean-American immigrant groups, thus improving the prevailing accounts on this topic. These works deliver a wide-ranging standpoint on the numerous features of freedom, flexibility, and identity that are inclined by gender. It offers how Park, Lee, and Kim portray the broader socio-political atmospheres of North Korea and the settler expedition through personal narratives and creative works, improving the understanding of gender in the detection of freedom.

Keywords: defector, gender, struggle, survival.

EN-29

The Tricksters Journey: Colonial Echoes and Cultural Hybridity in the Post-Colonial Era

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Abstract: The debut fantasy fiction, *Anansi Boys* (2005) by Neil Gaiman, interweaves African and Caribbean mythology and cultural Identity. This research paper ponders the concept of Neocolonialism in *Anansi Boys*. Cultural hybridity, identity construction, and resistance to dominance are examined from a Neocolonial perspective. It examines how Charles Nancy (Fat Charlie), the protagonist, rejects neocolonial exploitation and dominance through Postcolonial Theory and Cultural Studies. Additionally, it scrutinizes Cultural Hybridity, Identity Complexities, Power Dynamics, and Cultural Resistance utilizing Postcolonial intellectuals like Edward Said and Gayathri Chakravathy Spivak's theoretical frameworks. *Anansi Boys'* intricate critique of cultural appropriation and Global Capitalism's transformation of traditional myths is explored in the dual settings of London and the Caribbean. Neocolonial ideologies are traversed through the protagonist's Cultural Displacement and relationship with his father Anansi (Trickster God). Characterizations, symbolic representation, and thematic analysis of *Anansi Boys* shows Epistemic Violence, gained mastery over internalized inferiority, and retrieving the legacy.

Keywords: Epistemic Violence, Cultural Displacement, Cultural Hybridity, Cultural Resistance, Neocolonialism, Power Dynamics, Trickster.



Posthumanism and Environmental Consciousness in Contemporary Literature

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Abstract: Posthumanism critiques anthropocentric worldviews by recognizing the agency of non-human entities and advocating for a more interconnected relationship between humans and nature. This study examines posthumanist themes in *The Overstory* by Richard Powers, *Annihilation* by Jeff VanderMeer, and *Oryx and Crake* by Margaret Atwood, exploring how these texts reframe nature as an active force rather than a passive backdrop. Powers' novel highlights the intelligence and interconnectedness of trees, portraying them as sentient beings with agency. Vander Meer's work destabilizes human identity within an evolving ecosystem, blurring the boundaries between species and redefining selfhood. Atwood's dystopian vision critiques the dangers of bioengineering, exposing the ethical dilemmas of scientific overreach and humanity's role in environmental collapse. By applying ecocritical and posthumanist frameworks, this paper argues that these narratives collectively challenge traditional notions of human superiority, urging a reconsideration of humanity's place within the larger ecological web. These works emphasize the urgency of environmental awareness, presenting alternative ways of understanding existence beyond human-centered perspectives. Through literature, posthumanist discourse prompts critical reflection on ecological ethics, technological advancements, and the need for a sustainable, non-anthropocentric future.

Keywords: Posthumanism, Anthropocentrism, Ecocriticism, Environmental Ethics, Bioengineering, Interconnectedness, Non-Human Agency, Ecological Awareness, Science Fiction, Dystopian Literature.

**EN-31**

Exploring Green Theology and Sacred Ecology as a vital discourse in studying environmental literature

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Abstract: Green Theology examines the spiritual dimensions of ecological responsibility, advocating for a sacred bond between humanity and the natural world. This study explores *The Green Bible* as a theological framework and applies its principles to *Prodigal Summer* by Barbara Kingsolver, *The Overstory* by Richard Powers, and *The Year of the Flood* by Margaret Atwood. Kingsolver's novel portrays eco-spirituality through the interconnectedness of human and non-human lives, emphasizing biodiversity as sacred. Powers' work presents trees as divine entities within a larger ecological order, reinforcing nature's inherent sanctity. Atwood, in contrast, offers a dystopian perspective, depicting environmental collapse through religious symbolism and critiquing humanity's exploitation of the earth. By integrating Green Theology with ecocritical perspectives, this paper highlights how these literary texts redefine nature as a sacred presence, framing environmental preservation as a moral and spiritual obligation. These narratives collectively advocate for a deeper recognition of ecological ethics, urging a shift in human attitudes toward sustainability and reverence for the natural world. Ultimately, this study positions Green Theology as a vital discourse in environmental literature, emphasizing the necessity of spiritual engagement in addressing ecological crises.

Keywords: Green Theology, Eco-Spirituality, Environmental Ethics, Sacred Ecology, Ecocriticism, Biodiversity, Climate Crisis, Religious Symbolism, Nature and Divinity, Literary Ecology.



Mythology as Essential Tool for Enriching Human Mind with Aesthetic Semantics: A Conceptual Approach

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Abstract: Aesthetic Semantics is a term in linguistics with immense implications in Philosophy. Edmund Burke and Immanuel Kant have made significant contribution to interpreting aesthetics as beauty sensed through the meaning of words and their reflective applicability. Human beings start developing the habit of imagination and the creation of ideas about the objects both seen and unseen approximately between the ages of 2 and 10 years. Mythology gives a positive impetus in developing the child's creativity. Instead of merely describing the moon and its eclipse as cosmic figure and phenomenon, when it is described as the Goddess Selene, whom a monster slaughtered, the child becomes overexcited and interrogative to have more knowledge about the moon and other cosmic objects. Thus, a child becomes a philocalist and epistemophile without any burden. According to Plato, '...educating the young generation through the medium of myth is an ideal. When recommending the teaching of how things of the world came into being through myth, Plato referred to accounts that were considered reliable, to myths representing a particular category, the 'foundational myth' [*Republic*, 375 BCE] This article attempts to conceptualize the mechanism how mythology stimulates the human mind in generating aesthetic semantics, drawing illustrations from the Roman mythology.

Key words: Aesthetic semantics, cosmic figure and phenomenon, myth, impetus, epistemophele



EN-33

Raj Rasoi Aur Anya Kahaniya: Digital Food Culture and Its Role in Creating National Consciousness

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Abstract: Food and identity are deeply interrelated. It has social, historical, cultural and ideological significance. It plays a decisive role in creating individual and collective identity formation. The concept of a nation deeply contributes to an individual's food choices. The food choices one has are related to where he comes from. This study intends to do the analysis of Raj Rasoi Aur Anya Kahaniya a television series premiered in The Epic Channel and later featured on Netflix and Amazon Prime from the backdrop of gastronationalism and gastronativism. It also emphasizes the role of digital food culture in creating national consciousness. This study investigates the role of food as an ideological tool and how it is used as a medium to disseminate political stances.

Keywords: Digital food culture, Identity, National Consciousness, Globalization, Gastronativism, Gastronationalism.



EN-34

The Plight of the Indian Women During the Partition: An Analysis of Amritha Pritam's Pinjar

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Abstract: Amritha Pritam is a well-known Indian novelist popularly known for the novel, Pinjar. The novel is set during the Partition of Indian. In this work, the novelist exposes the tragic situations faced by the Indian citizens during the Partition. Through the female characters, the novelist brings out the themes of love, isolation, identity crisis and harassment of women in India. The paper seeks to explore the poor plight of Indian woman who faced severe problems during the mass migration. The paper analysis's the pity state of women through various female characters in the novel such as Puro, Rajjo, Pagli and Lajjo. Large scale violence happened during this great event where children were kidnapped and women were raped. Through these characters, it is analyzed how women are caught under the threshold of society and become victims to innumerable factors of life. The women were affected by both, physically and psychologically and their voices remained unheard. Pritam raises her voice on behalf of the silent victims who are unable to support themselves in this vulnerable situation.

Keywords: Harassment, migration, identity crisis, isolation.



EN-35

The Reconstruction of the Self: Self-Perception Theory in Ian McEwan's *Atonement* and Margeret Atwood's *The Blind Assassin*

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Abstract: This paper examines Ian McEwan's *Atonement* and Margaret Atwood's *The Blind Assassin* through the lens of social psychology. The study adopts a qualitative literary analysis methodology. The close reading of the select novels examine the transformation in the personality of the protagonists. The theoretical framework of the study is the Self-Perception Theory by Daryl Bem. The main objective of the research is to explore the protagonist's transition in the self-perception and observation of their actions within a social context. Both authors present the women's shift in their identity and self-image. The aim is to analyse a character's construction and reconstruction of identities by reflecting on their past actions and desire for redemption. The study highlights the influence of class positions of characters in shielding them from the immediate consequences of their wrong doings in the past. Moreover, the study also analyses the significance of writing as a tool for a psychological coping mechanism for their guilt. It investigates the burden of past memory and the desire for redemption for past actions. Furthermore, the research study analyses the complex narrative techniques to explore self-perception through the themes of trauma, guilt, responsibility, and class differences. Therefore, the research emphasises the construction of women's identities in response to social pressures and reconstruction through self-realisation.

Key Words: Social Psychology, Self- Perception, Guilt and Memory.



EN-36

Unveiling the Self: Brida's Quest for Self-Discovery and Authenticity

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Abstract: The paper, entitled "Unveiling the Self: Brida's Quest for Self-Discovery and Authenticity," analyzes Paulo Coelho's novel Brida. The research work aims to examine the critical role of curiosity in the investigation of new concepts and the attainment of knowledge. Philosopher and psychologist William James thinks that curiosity augments cognitive performance. According to William James curiosity is fundamental for children's exploration of their surroundings. They are attracted to flamboyant and eye-catching products. As they develop, their understanding progresses to a higher level of scientific and philosophical knowledge. The protagonist Brida exemplifies these elements. Paulo Coelho is a Brazilian author popular for his celebrated works, The Alchemist and Eleven Minutes, which have together sold in excess of 100 million copies worldwide. Coelho predominantly highlights the quest for knowledge, existential philosophy, self-discovery, spirituality, and love. This research paper aims to analyze the inquisitive inquiry techniques in a specific novel by Paulo Coelho.

Keywords: Pari Prashna, Curiosity, Psychology, Knowledge, Self-discovery, Goals, Magic



EN-37

Metaphor as a Transformative Tool in Sylvia Plath Select Poems: A Conceptual Metaphor Theory Approach

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Abstract: This research explores the role of metaphor as a transformative tool in Sylvia Plath's poetry, using Conceptual Metaphor Theory (CMT) as its analytical lens. While Plath's work has been thoroughly analyzed through literary and psychological perspectives, the cognitive processes behind her use of metaphor have not been sufficiently examined. This study aims to address this gap by investigating how metaphors shape meaning, perception, and emotional resonance in her poetry. By conducting a detailed analysis of selected poems, this research highlights key conceptual metaphors that turn abstract experiences into concrete expressions. Through the lens of CMT, it examines how Plath's metaphorical language creates rich interpretations, prompting shifts in perception and deepening reader engagement with her work. The findings suggest that her use of metaphor goes beyond mere stylistic choice; it acts as a cognitive tool that redefines traditional associations and challenges established perspectives. By situating Plath's poetry within the broader framework of cognitive poetics, this study emphasizes the complex interplay between metaphor and the process of meaning-making. It contributes to the growing field of metaphor studies in literature, demonstrating the significant role of conceptual metaphors in poetic transformation.

Keywords: Conceptual Metaphor Theory (CMT), metaphor, emotional resonance , transformation, cognition .

Exploring Ecopsychology: Theory of Natures Healing Power and Human Reciprocity

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Abstract: This study examines at how the current generation is becoming more and more disconnected from nature, highlighting how they would rather use contemporary technology and be exposed to harmful societal influences than spend time in nature. It looks at how nature can help those who are experiencing emotional difficulties and support their recovery and achievement. In order to investigate how nature might promote emotional recovery, the study takes a qualitative approach and integrates a number of psychological theories, including Ecotherapy, Restoration Theory. Ecotherapy, a therapeutic approach that has been demonstrated to improve mental health and resilience, particularly in children with depressive diagnoses, is at the heart of this study.

In order to demonstrate the transformational influence of nature and encouraging friendships on character development, the study uses examples from children's literature, including *The Secret Garden* and *My Side of the Mountain*. These books offer insightful case studies for comprehending the ways in which consistent exposure to nature and constructive social interactions support social integration and personal development. In order to show how environment improves the emotional health of the major characters in these novels, the study examines their journeys through hardship and success. According to the research's hypothesis, children's emotional well-being is greatly enhanced by frequent exposure to nature, which also helps them develop better overall and build resilience. Through analysing literary examples, this study promotes a return to nature as a means of healing and development for children in the modern period. Using literature and nature's natural power to lead people toward achievement, emotional equilibrium, and fulfilment as motivation, it invites the current generation to rediscover the natural world.

Key Words: Nature, Friendship, Depressed, Vision, Children's Literature.

EN-39

Myth and Modernity in the Select Plays of Girish Karnad

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Abstract: Girish Karnad, one of India's foremost playwrights, is known for his innovative use of myth, folklore, and historical narratives to address contemporary concerns in Indian society. This paper examines the dynamic relationship between myth and modernity in three of his major works: *Tughlaq*, *Hayavadana*, and *Naga-Mandala*. While rooted in ancient traditions, Karnad's plays use myth not merely as a symbolic or decorative element but as a powerful narrative tool to critique and reflect on modern dilemmas such as identity, power dynamics, and the tension between tradition and progress. In *Tughlaq*, Karnad explores the complexities of leadership and political idealism, using the historical figure of Sultan Muhammad bin Tughlaq as a metaphor for the tension between visionary reforms and the cultural realities of the time. The play critiques the clash between idealism and pragmatism, positioning Tughlaq as both a modern ruler and a tragic figure, emblematic of the failure to reconcile tradition with progress. In *Hayavadana*, Karnad delves into the psychological fragmentation of identity. By reimagining the myth of the headless horseman, the play explores the existential dilemma of modern individuals grappling with self-definition in a fragmented, postcolonial world. The characters' struggles with their own incomplete identities reflect modern anxieties about selfhood, alienation, and the search for completeness. *Naga-Mandala*, on the other hand, integrates the myth of the Naga (snake) to examine themes of gender, desire, and social structures. By reimagining the traditional and infusing it with modern themes, Karnad's plays offer a unique perspective on the negotiation between the past and the present, showing how myths are alive and capable of addressing the ethical, psychological, and political crises of modern society. Ultimately, Karnad's plays invite audiences to reflect on the relevance of myths in the modern world, not as relics of the past but as dynamic narratives that continue to shape and inform contemporary human experiences.

Keywords: Myth, folklore, decorative element, fragmentation, modern anxieties, reimagining

**EN-40**

Sudha Murthy: Over Ambition Leads to Alienation in Marriage

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Abstract: This story was about a bright young man and a girl, who knew each other from their school days. In fact, they were class mates and both had broken record in the Bangalore SSLC Board as Shrimati stood first and Shrikant stood second. In the beginning, Shrikant was not happy as Shrimati had proved she better than him. Soon after the rejoicings of success, they met in train going to their relatives. During the journey, they got a chance to know each other and promised to become friends. They thought that there was nothing wrong in being friends. They decided to meet under the Bakula tree as they had a bakula tree in common. Early in the morning, the flowers were freshly fallen; spreading its fragrance as well as forming a carpet of blossoms. They decided that it could be a right place. As Shrimati liked Shrikant, strategy of choosing a right place, she nodded her head with a cute smile.

The Bakula tree was the most significant part of the story until the third quarter. It was the bakula that led to the both of a new and a sweet friendship that of a new and sweet friendship that further blossomed into an unconditional and innocent love between these two Shrikant and Shrimati. It was the one which joined the two souls and even witnessed their union when in marriage ceremony Shrimati would diligently gather the bakula flowers, while Shrikant would talk about his college and his dreams. Either Shrimati's house or Shrikant's house was not aware of their flower gathering meetings.

Keywords: Sudha Murthy, Literature, Indian fiction.

**EN-41**

Gender and Power Dynamics in Bapsi Sidhwa's *Their Language of Love*

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Abstract: In a patriarchal society where women's lives are limited by marital, cultural, and religious norms. Bapsi Sidhwa's novel, *Their Language of Love* (2013), provides an in-depth analysis of the gender and power dynamics inherent in such a culture. It examines how women navigate their agency and autonomy under the confines of authoritarian regimes. The research examines the relationship between gender roles and power in Sidhwa's narrative using feminist frameworks and theoretical views on partition, ethnicity, and Islamic law. The research elucidates the mechanisms that both support and contest power in women's lives, while also revealing the intricate methods by which women face and repudiate patriarchy. The study results indicate that Sidhwa's depiction of gendered power dynamics provides a framework for examining the possibilities for transformation and agency under increasingly authoritarian regimes.

Keywords: Gender, Patriarchy, Power, Resistance, Feminism, Ethnicity, Cultural Norms, Transnationalism

EN-42

Cryonics, Consciousness, and the Question of Identity in *Zero K*

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Abstract: This article explores the intricate relationship between cryonics, consciousness, and identity in Don DeLillo's *Zero K*. The novel presents a speculative future in which human bodies are cryogenically preserved with the promise of future revival, raising thoughtful questions about the continuity of selfhood and the nature of posthuman existence. Analyzing the novel's engagement with transhumanist ideals and its philosophical interrogation of consciousness, this paper argues that *Zero K* critiques the notion that identity can survive beyond the limits of biological life. The study employs a posthumanist theoretical framework to examine the novel's depiction of memory, embodiment, and technological immortality, ultimately questioning whether selfhood can truly persevere in a post-biological state. Additionally, this paper investigates the novel's broader analysis of technological determinism and the ethical dilemmas posed by cryonics. The article also examines how DeLillo's narrative structure and stylistic choices reinforce the themes of existential uncertainty and the fragility of human consciousness. By situating *Zero K* within the larger discourse of posthumanism and bioethics, this study sheds light on the novel's implications for contemporary debates surrounding artificial intelligence, longevity research, and the philosophical boundaries of identity. In doing so, it highlights the paradoxical nature of humanity's quest for immortality and the potential loss of meaning in a technologically mediated existence.

Keywords: Cryonics, Consciousness, Identity, Posthumanism, Don DeLillo, *Zero K*, Transhumanism, Memory



EN-43

Shattered Minds: The Cinematic Representation of Trauma and Psychological Conflict in the movie *Manmadhan* and *Ratsasan*

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Abstract: This Paper looks at how trauma is portrayed in *Manmadhan* and *Ratsasan* as an emotional narrative tool, emphasizing how violence can cause severe psychological suffering. In contemporary film, trauma and psychological struggle are major subjects that are frequently examined through the lens of violence. The main characters in both movies struggle with mental uneasiness, which is influenced by conflicts from their past and present and drives them to consider moral and existential issues. The study explores the various ways that distress might appear, ranging from externalized violence and breakdowns to internalized guilt and emotional depression. This analysis also emphasizes how these movies employ moral disengagement theory to immerse audiences in the psychological states of their characters through nonlinear storylines, sound design, and visual storytelling. This paper compares these two movies in an effort to comprehend broader tendencies in how trauma and conflict are portrayed in modern cinema. By showing that violence is not only an aesthetic decision but also an essential storytelling component in capturing human vulnerability and resiliency, the findings will add to larger conversations about how contemporary filmmakers portray distress narratives.

Keywords: Psychological Conflict, Trauma, Human Vulnerability, Resilience, Mental Anxiety.



EN-44

Breaking Boundaries and Bridging Cultures: Cricket in Ewart Rouse's *Sticky Wicket Vol I: Watkins at Bat*

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Abstract: Sports is one of the few powerful tools that promote unity - overcoming cultural, societal and political divisions. Cricket plays a key role in bringing together people of different age, language and ethnicity by breaking national boundaries. Cricket is a strategic game with extended playtime. The setting of Cricket in sports fiction explores themes of cultural legacy, conflict, struggle for dominance, teamwork and expressing cultural roots. This enables complex storytelling, layered character development and deep reflection on personal and social struggles.

Ewart Rouse's *Sticky Wicket Vol I: Watkins at Bat* is a cricketing tale that is viewed through a prism of immigrants. Set in Fernwood, New Jersey, USA this narration traces the event of a single day. It follows Frederick A. Watkins, the Trinidadian Manager of Fernwood Cricket Club and his team as they come together to play against their rival and also to save their field from being destroyed. This paper explores how Fernwood Cricket Club with its team of immigrants from various cricketing diaspora come together to play the game that is part of their cultural identity and passion. It discusses the universal appeal for cricket as it breaks boundaries and bridges cultures by serving as a vehicle for cultural integration and unity.

Keywords: Cultural integration, Cricket, Unity, Strategy



EN-45

Supremacy of Domestic Violence in Chimamanda Ngozi Adichie's Purple Hibiscus

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Abstract: Gender violence has emerged as a new field of study in literary and cultural studies, especially in light of the twentieth-century rise of the feminist movement. This is actually because female violence has become a common occurrence in exceptional societies and has taken center stage in discussions on societal issues. Violence and conflict have been exacerbated by factors including colonial training, culture, religion and patriarchy. As a well known feminist activist, Chimamanda Adichie discusses these aspects of gender violence and concentrates on domestic abuse. She also symbolizes how spiritual fanaticism affects family relationships and how knowledge and education are essential to enlightenment and empowerment. Thus, the challenge of female violence in Chimamanda Adichie's Purple Hibiscus is examined in this research. It makes an effort to soften the oppression and brutality that the book's male and female characters endure as a result of African culture and spiritual fanaticism.

Keywords: African culture, spiritual fanaticism, domestic violence, oppression

EN-46

Gender Identities: Queer Representation in Shaping Cultural and Literary Landscapes

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Abstract: Queer literature challenges rigid gender binaries and redefines identity as fluid and evolving, offering a critical space to examine the complexities of gender and sexuality. This study analyzes *Orlando* by Virginia Woolf, *The Song of Achilles* by Madeline Miller, and *Giovanni's Room* by James Baldwin through the lens of queer theory. Woolf's novel subverts traditional gender norms by depicting a protagonist who transforms across centuries, questioning fixed notions of identity and societal expectations. Miller's reimagining of Achilles and Patroclus centres queer love within classical mythology, reclaiming marginalized narratives and portraying same-sex desire with emotional depth. Baldwin's novel, set against the backdrop of mid-20th century societal repression, explores the struggles of internalized homophobia, self-acceptance, and the constraints imposed on queer identity in a heteronormative world. These works emphasize the significance of LGBTQ+ representation in shaping cultural and literary landscapes, affirming the power of literature to reflect and influence the complexities of identity, love, and belonging. Ultimately, this study underscores the transformative role of queer literature in expanding perspectives on identity and challenging restrictive social constructs.

Keywords: Queer Literature, Gender Fluidity, LGBTQ+ Representation, Identity and Sexuality, Queer Theory, Feminist Criticism, Classical Mythology, Societal Repression, Literary Evolution, Intersectionality.



EN-47

Geological Catastrophe as Political Allegory: Environmental Injustice and Exploitation in the Broken Earth Trilogy

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Abstract: This paper investigates the role of geological catastrophe as a political allegory in N.K. Jemisin's *The Broken Earth Trilogy*, analyzing how environmental disasters mirror larger themes of exploitation, oppression, and environmental injustice. Set in a dystopian world beset by seismic disasters, Jemisin's trilogy reveals a complicated relationship between environmental degradation and social inequalities, particularly highlighting how marginalized groups, especially the orogenes, are exploited for their unique abilities to manipulate the Earth's volatile forces. The environmental crises depicted in the novels are not simply natural events; they are the result of systemic oppression, poor political decisions, and the commercialization of both natural and human resources. This paper, drawing on postcolonial and Marxist theories, examines how Jemisin critiques capitalist and colonial power structures, showing that the exploitation of marginalized groups reflects the exploitation of the Earth itself. The racial oppression faced by orogenes and the persistent geological disasters act as metaphors for real-world issues such as environmental racism, class oppression, and the unequal effects of ecological decline on vulnerable communities. By framing environmental disaster as a consequence of political and social systems, Jemisin's work offers a compelling critique of current environmental injustices and sheds light on the connections between race, class, and environmental degradation in both fictional narratives and real-life situations.

Keywords: Marginalized, Exploitation, Environmental, Postcolonial, Marxist, Political



Machiavellian Motifs in the Judge from Hell: A Deep Dive into Strategic Deception

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Abstract: In a society that often oversimplifies the importance of virtue and positivity, there still exists a flatline of fraudulent practices and manipulations that puts the welfare of society at risk. Modern society attempts to survive under the veil of morality, but often gets caught up into Machiavellianism, where strategic selfishness and self-promotion triumph over ethics. Here, corruption is analysed with painstaking detail as the author or lack of Machiavellianism self-interest in the relationship between people of society becomes so deeply engrained that it overwhelming becomes inescapable. This research attempts to apply the same analysis to the South Korean television series *The Judge From Hell*, which unravels complex and multifaceted Machiavellian motives spanning the entire tale. The Judge from Hell is an exemplary case in point that captures the moral ambiguities of characters tangled in webs of espionage and convoluted, self-serving actions. The series serves as a case study to understand the psychological motives that fuel Machiavellian behaviour in personal and professional settings. It is essential to ask how extensively and aggressively Machiavellianism is represented in modern media.

Keywords: Machiavellianism, Manipulation, Deception, KDrama.



EN-49

Improving English Speaking Skills: Overcoming Challenges and Applying Effective Strategies

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Abstract: Speaking is a fundamental aspect of language learning, yet many English as a Foreign Language (EFL) learners face challenges in achieving fluency and confidence. This study examines the key factors influencing speaking skills, including anxiety, vocabulary knowledge, grammatical accuracy, and pronunciation. Additionally, it explores effective teaching strategies such as role-playing, guided conversations, and flipped learning. The findings emphasize the importance of interactive methods in enhancing students' oral proficiency. The study concludes with practical recommendations for incorporating these approaches into classroom instruction to strengthen learners' communicative competence.

Keywords: Speaking Proficiency, EFL Learners, Role-Playing, Guided Conversations, Language Anxiety, Pronunciation, Flipped Learning, Vocabulary Development.

Myth, Culture, and Performance: An Exploration of Wayang Kulit in *Shadow Princess*

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Abstract: This paper examines the relationships between myth, culture, and performance in the novel *Shadow Princess*. The novel masterfully interweaves Indonesian mythology, folklore, and traditional art forms through a critical analysis of the novel's use of Wayang Kulit, an ancient form of Indonesian shadow puppetry. It explores how mythology and performance shape cultural identity and provide a platform for cultural values. By applying performance theory and cultural studies, this paper reveals the ways in which *Shadow Princess* employs Wayang Kulit to navigate the nuances of Indonesian culture and identity. The novel's use of mythological narratives and performance is examined as a means of exploring the intersections between tradition and modernity. Through storytelling, particularly featuring mythological animal characters, the protagonist embarks on a journey to reconnect with her family and find hope. This narrative approach not only allows the protagonist to navigate her complex identity but also provides a platform for cultural expression, resilience, and healing. Hence, this paper contributes to a deeper understanding of the cultural significance of Wayang Kulit in Indonesian literature and culture, while also it highlights the significance of mythology and performance in shaping cultural identity.

Keywords: Indonesian literature, mythology, performance, Wayang Kulit, cultural identity, Cultural Values, and storytelling.

**CONFERENCE NOTE:**

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