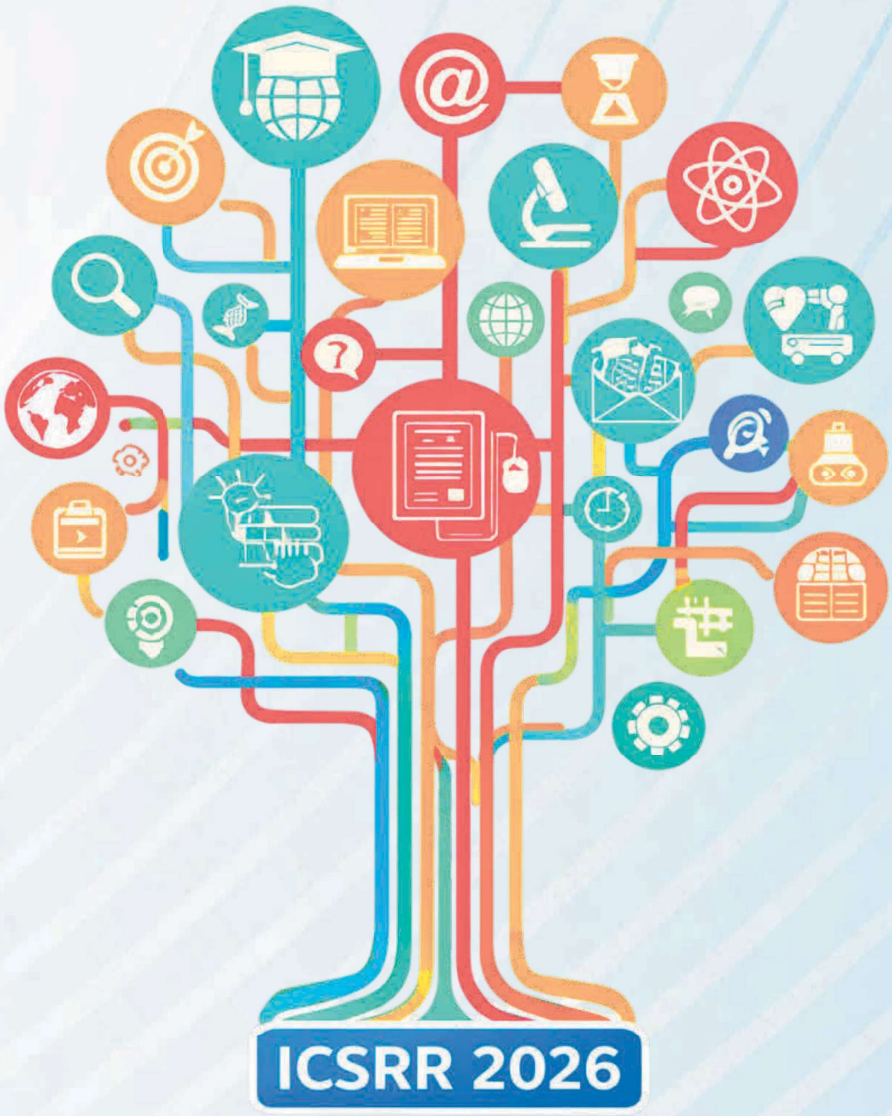
International Conference on Scientific Research and Revolution

ICSRR 2026

March 21-22, 2026



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ICSRR 2026

March 21-22, 2026
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Proceedings of International Conference on Scientific Research and Revolution

ICSRR 2026

March 21-22, 2026

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ABOUT CONFERENCE

The International Conference on Scientific Research and Revolution (ICSRR 2026), scheduled on March 21-22, 2026, will be conducted in virtual mode, providing a global platform for researchers, academicians, and industry professionals to share ground-breaking ideas and transformative innovations. This conference will spotlight pioneering research and revolutionary approaches across diverse scientific domains, fostering discussions that challenge conventional thinking and open new frontiers of knowledge.

Through engaging technical sessions and thought-provoking presentations, participants will explore emerging trends, disruptive technologies, and forward-looking solutions that have the potential to shape the future of science and society. Experts from multiple disciplines—including engineering, natural sciences, social sciences, technology, and management—will come together to present cutting-edge work and address pressing global and societal challenges.

With a strong focus on collaboration, innovation, and impactful outcomes, ICSRR 2026 will serve as a unique forum for networking, exchanging ideas, and inspiring research that can lead to meaningful change. Leveraging virtual technologies, the conference aims to ensure inclusivity and reach, enabling participation from across the globe in this pivotal dialogue on the evolution and revolution of scientific research.

ABOUT ORGANIZER

Scientific Research Reports (SRR Books) is an innovative publishing company that publishes digital books in a wide range of arts, social, science, and technology fields and is registered and approved as a digital book publisher with the Government of India. The goal of the Scientific Research Reports is to encourage the dissemination of both fundamental and applied research across the various academic fields and research communities located all over the world. In addition to this, it intends to create research networking among the many different research groups and encourage conversation on emerging research standards

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Dr. S. PURUSHOTHAMAN, B.E., M.E., Ph.D. (IIT Madras) serves as the Professor and Principal of the School of Engineering and Technology at Jaipur National University, Jaipur, Rajasthan. With over 33 years of dedicated teaching experience, he plays a vital role in shaping engineering education through effective instruction, innovative research, and academic leadership. He actively contributes to curriculum development, institutional planning, and research mentoring. Dr. Purushothaman has published 189 research articles in reputed journals, secured two granted patents, and authored three book chapters, reflecting his strong research orientation. He has successfully supervised 45 Ph.D scholars, guiding them toward impactful research outcomes. His extensive experience and commitment continue to strengthen academic excellence and research culture.

Dr. ABHISHEK SHARMA is an accomplished academic in Mechanical Engineering with degrees from Pt. Ravi Shankar Shukla University, Raipur, NIT Bhopal, and NIT Rourkela. He currently serves as an Assistant Professor at Government Engineering College Palamu under the Department of Higher and Technical Education, Jharkhand. His research focuses on renewable energy, waste-to-energy conversion, alternative fuels for internal combustion engines, and air pollution. He was the principal investigator of a government-funded project on converting waste plastic into liquid fuel. With over 150 publications, 3700+ citations, and an h-index of 36, he has earned global recognition. He holds six Indian patents, two copyrights, and is ranked among the top 2% of scientists worldwide, as recognized by Stanford University and Elsevier.

Dr. S. PADMANABHAN is a senior academician, researcher, and innovator in Mechanical and Automobile Engineering. He holds a B.E. in Mechanical Engineering, an M.E. in Automobile Engineering, an MBA in Operations Management, and a Ph.D. in Gearbox Design Optimization. He is currently serving as Professor in the Department of Mechanical Engineering at Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai, where he has been associated since June 2018. With more than 21 years of teaching experience, he has successfully guided several undergraduate, postgraduate, and doctoral research scholars. His research interests include gearbox design and optimization, automotive systems, advanced manufacturing, tribology, and mechanical system optimization. He has published over 150 research papers in reputed national and international journals and conferences and has been granted 10 design patents.

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ICSRR 2026 - PAPER INDEX

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ICSRR – S001

COST-EFFECTIVE SYNTHESIS OF Mn_3O_4 NANOPARTICLES AND THEIR STRUCTURAL, MORPHOLOGICAL, AND MAGNETIC ANALYSIS

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Abstract:

Manganese oxide nanoparticles (Mn_3O_4) were synthesized through a facile and cost-effective chemical precipitation method using manganese chloride ($MnCl_2$) as the precursor. The precipitation was carried out by the controlled addition of alkaline solution under constant stirring, followed by filtration, washing, drying, and calcination to obtain phase-pure Mn_3O_4 nanoparticles. The synthesized nanomaterials were comprehensively characterized to investigate their optical, structural, morphological, and magnetic properties. UV–Visible spectroscopy analysis showed characteristic absorption bands in the ranges of 220–275 nm and 360–370 nm, which are attributed to charge transfer transitions and intrinsic band gap absorption of Mn_3O_4 nanoparticles. The blue shift observed compared to bulk material confirms the nanoscale nature of the particles. Fourier Transform Infrared (FT-IR) spectra displayed broad absorption around 3400 cm^{-1} corresponding to O–H stretching vibrations of adsorbed moisture, a band near 1630 cm^{-1} due to H–O–H bending, and strong Mn–O stretching vibrations in the region 520–630 cm^{-1}, confirming the formation of manganese oxide spinel structure. X-ray diffraction (XRD) patterns exhibited sharp and well-defined peaks indexed to the tetragonal hausmannite Mn_3O_4 phase, corresponding to crystallographic planes such as (101), (112), (200), (103), (211), and (220), confirming good crystallinity and phase purity. The average crystallite size calculated using the Debye–Scherrer equation was found to be approximately 20 nm. Scanning Electron Microscopy (SEM) images revealed nearly spherical nanoparticles with slight agglomeration due to high surface energy, and particle size distribution centered around 20 nm. Magnetic measurements using Vibrating Sample Magnetometry (VSM) demonstrated a linear magnetization curve with negligible coercivity and remanence, indicating paramagnetic behavior at room temperature. The obtained results confirm the successful synthesis of nanoscale Mn_3O_4 with desirable structural and magnetic properties, making them suitable for potential applications in catalysis, environmental remediation, sensors, and magnetic nanodevices.

Keywords: *Mn_3O_4 nanoparticles; Chemical precipitation; UV–Visible spectroscopy; FT-IR; XRD analysis; SEM morphology; VSM studies; Paramagnetic behavior; Spinel structure.*

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ICSRR – E002

SKIN GUARD AI: DEEP LEARNING-BASED DERMATOLOGY ASSISTANT WITH EMAIL NOTIFICATION

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Abstract:

Skin diseases such as eczema, psoriasis, acne, and fungal infections affect millions of people worldwide and require early detection for effective treatment. However, traditional diagnosis relies on dermatologists and clinical examinations, which may not always be accessible due to limited specialists, high costs, and long waiting times, particularly in rural areas. This project proposes an AI-powered skin disease detection and management system using a Convolutional Neural Network (CNN) for image-based classification. Users can upload images of affected skin through a web interface, where the system preprocesses the image and analyzes it using the trained CNN model to identify the disease and provide a confidence score.The system also offers personalized treatment suggestions, including medications, skincare advice, and preventive measures. Additionally, an integrated chatbot assists users by answering health-related queries, while an automated email notification sends diagnostic reports to the registered guardian. Overall, the system enhances accessibility, supports early detection, and provides an efficient and user-friendly solution for skin disease management.

Keywords: *Artificial Intelligence (AI), Deep Learning, Convolutional Neural Network (CNN), Skin Disease Detection, Medical Image Classification, Dermatology Assistant, Image Preprocessing.*

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ICSRR – S003

HEALTHCARE WASTE THROUGH THE LIFE-CYCLE LENS: ASSESSING ITS IMPACTS ON HEALTH AND THE ENVIRONMENT

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Abstract:

The health-care sector contributes nearly 75% of waste generated from the healthcare supply chain, including pharmaceuticals, medical devices, and other consumables. Improper disposal of medical waste has a significant environmental impact, contaminating soil, water, and air. This contamination contributes to the spread of infectious diseases and various pollution-related problems. Life Cycle Assessment (LCA) is a key method used to measure the environmental impact of healthcare products and services across their entire lifespan. It helps identify major pollution hotspots and guides efforts to reduce emissions. To understand public knowledge and perceptions, a survey was conducted targeting different groups in Oman. The survey collected information about awareness of medical waste, environmental concerns, familiarity with waste-handling procedures, and opinions about sustainable products and technologies. The results showed high awareness among participants regarding the dangers of improper medical waste disposal However, many respondents had never received any training on waste management, highlighting the need for better educational programs. The study also compared alternative waste treatment methods, including autoclaving, microwaving, lime disinfection, and CO_2 sterilization, finding that safer technologies can reduce pollution when properly implemented. Additionally, participants expressed positive views toward the use of artificial intelligence to improve waste segregation and monitoring. Overall, the findings emphasize the importance of sustainable waste management practices, stronger policies, and awareness programs to protect both people and the environment.

Key words: *Healthcare waste, life cycle assessment, health and environment.*

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ICSRR – E004

COMPARATIVE PHYTOCHEMICAL AND BIOACTIVITY ANALYSIS OF *EUPHORBIA HIRTA* AND *GYMNEMA SYLVESTRE* USING AQUEOUS EXTRACTS

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Abstract:

Plant-derived bioactive compounds have gained considerable attention in recent years due to their diverse therapeutic properties and potential applications in modern healthcare. Medicinal plants such as *Euphorbia hirta* and *Gymnema sylvestre* are rich sources of phytochemicals including flavonoids, phenolics, saponins, and tannins, which exhibit significant antioxidant, anti-inflammatory, antimicrobial, and antidiabetic activities. Despite their pharmacological potential, the practical use of plant extracts in pharmaceutical and nutraceutical formulations is often limited by issues such as poor stability, low aqueous solubility, rapid degradation, and reduced bioavailability. To overcome these limitations, nano-encapsulation technologies have emerged as an effective strategy for improving the delivery and therapeutic performance of plant-derived bioactive. Among various nanocarrier materials, pectin a natural polysaccharide obtained from plant cell walls has attracted increasing interest due to its biodegradability, biocompatibility, non-toxicity, and excellent gel-forming properties. Pectin nanoparticles can be produced through ionic gelation using calcium chloride as a cross-linking agent, forming stable nanostructures capable of encapsulating sensitive phytochemicals. These nano formulations enhance the stability, solubility, and controlled release of plant bioactive, thereby improving their overall bioavailability and therapeutic efficacy. Furthermore, optimization techniques such as response surface methodology and Box–Behnken design enable the development of nanoparticles with desirable physicochemical characteristics. Characterization methods including particle size analysis, zeta potential measurement, and spectroscopic techniques provide insights into nanoparticle stability and encapsulation efficiency. This review highlights the principles of nano-encapsulation, the role of pectin as a natural polymer, and the potential biomedical, nutraceutical, and pharmaceutical applications of nano-encapsulated plant extracts while discussing current challenges and future research prospects.

Keywords: Pectin nanoparticles, Nano-encapsulation, *Euphorbia hirta*, *Gymnema sylvestre*; Phytochemicals.

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ICSRR – S005

PREPARATION AND CHARACTERIZATION STUDIES OF NiO NANOPARTICLES AND NiO-Pd, NiO-Pd-PEG NANO COMPOSITE BY USING FIG LEAVES EXTRACT AND ITS APPLICATION

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Abstract:

Fig leaves (Ficus carica) have recently gained scientific interest for their rich biochemical constituents, enabling the green synthesis of metal oxide nanoparticles. In this work, NiO nanoparticles (NiO NPs) were synthesized using an eco-friendly fig leaf extract and further combined with $PdCl_2$ to form a NiO-Pd nanocomposite with enhanced physicochemical properties. FTIR analysis confirmed Ni–O vibrational peaks at 486.8 cm^{-1} and 422.18 cm^{-1} for NiO, while the NiO-Pd samples exhibited characteristic stretching bands below 620 cm^{-1}, particularly 442 cm^{-1} and 416 cm^{-1}. UV–Vis spectra revealed absorption peaks at 300 nm and 600 nm for NiO and at 330 nm and 327 nm for NiO-Pd, reflecting changes in electronic transitions after Pd incorporation.TEM analysis showed that NiO nanoparticles were spherical with slight agglomeration, whereas NiO-Pd samples exhibited well-distributed Pd particles anchored on the NiO surface, confirming successful composite formation. Electrical measurements indicated that Pd incorporation significantly enhanced conductivity and charge-transfer behavior, while the addition of PEG in the NiO-Pd-PEG sample further improved electron mobility. Mechanical performance, evaluated using the rebound hammer test, revealed that NiO-Pd exhibited higher hardness compared to NiO, while PEG-modified samples displayed improved flexibility and structural stability. Antimicrobial results demonstrated that the solid form of NiO NPs showed more inhibition than the liquid form against S. aureus and E. coli, with NiO-Pd exhibiting superior antibacterial performance overall. These findings highlight the potential of NiO-based nanomaterials—particularly NiO-Pd and NiO-Pd-PEG—in environmental, industrial, and biomedical applications due to their improved structural, electrical, mechanical, and antimicrobial characteristics.

Keywords: nano particles; nano composite; NiO-Pd; NiO-Pd-PEG;

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ICSRR – M006

THE IMPACT OF MUTLI-GENERATIONAL WORKFORCE ON YOUNG PROFESSIONALS IN CHENNAI CITY

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Abstract:

Modern organizations consist of individuals from different generational groups, creating a multi-generational workforce environment. Each generation possesses distinct work values, expectations, and communication styles, which influence workplace interactions and productivity. This study examines the impact of a multi-generational workforce on young professionals. The research aims to understand generational differences in work attitudes, communication patterns, and collaboration. The study adopts a descriptive research design and uses structured questionnaires for collecting primary data. The findings indicate that generational diversity contributes to knowledge sharing, innovation, and organizational learning. However, differences in work expectations and communication styles may create challenges in workplace relationships. Effective management strategies, flexible work policies, and inclusive organizational culture are necessary to manage generational diversity successfully.

Keywords: *Multi-Generational Workforce, Young Professionals, Generational Diversity, Workplace Collaboration, Organizational Performance*

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ICSRR – E007

NANOENCAPSULATION-DRIVEN MICROBIAL HYDROGEL SPRAY FOR AUTONOMOUS CONCRETE CRACK HEALING

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Abstract:

Concrete microcracking still poses a significant problem that cuts down the durability of the structure, lets water in, and raises the cost of maintenance. In order to solve this problem, a novel, nanoengineered hydrogel system that is sprayable has been created by putting together nanoencapsulated Bacillus subtilis spores, urease-loaded nanogels, and mesoporous silica nanoparticles for the purpose of autonomous healing of cracks. Spores were encapsulated by means of a layer-by-layer (LbL) nanoshell technique using chitosan and alginate bilayers, which included 6–10 layers, thus increasing the resistance to UV radiation, desiccation, and alkaline conditions, while still allowing more than 80% germination. Urease immobilization in alginate nanogels (150–300 nm) gave the high catalytic activity so that the early precipitation of calcium carbonate was thus initiated. The mesoporous silica nanoparticles formed the urea reservoirs and the nucleation sites giving a boost to the mineral deposition in the cracks. A two-phase spray is used in the delivery of the system: Phase A comprises the biological nanocomponents in an alginate-xanthan hydrogel and Phase B provides calcium ions. At the time of application, the phases intermix at the crack surface, thereby stimulating microbial proliferation and mineralization at the nanoscale. The planned evaluations will cover nanoscale characterization (DLS, zeta potential, SEM, TEM), biological assays (colony recovery, urease activity), and mechanical performance tests (crack closure, permeability reduction, reinforcement). This concept showcases the synergy of nanoencapsulation and microbial self-healing leading to sustainable and high-performance construction materials.

Keywords: Nanoencapsulation, microbial hydrogel spray, Bacillus subtilis, urease nanogels,mesoporous silica, microbial self-healing concrete

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ICSRR – E008

AN EMPIRICAL STUDY ON COST OVERRUN FACTORS IN CONSTRUCTION PROJECTS USING STATISTICAL INDEX METHOD

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Abstract:

Cost overruns remain one of the most persistent problems in construction project management. Rapid urbanization and increasing infrastructure demand have intensified the complexity of project planning and execution, particularly in developing regions. This study investigates the major factors contributing to cost overruns in urban construction projects through a structured questionnaire survey conducted among construction professionals in Tamil Nadu, India. A total of forty valid responses were collected from contractors, consultants, engineers, and project managers. Ten significant cost overrun factors were identified through literature review and expert consultation. The collected data were analyzed using Frequency Index (FI), Severity Index (SI), and Importance Index (II) methods to rank the influence of each factor. The findings reveal that fluctuation in material prices, delay in approvals, design changes, and inaccurate cost estimation are the most critical causes of cost escalation in urban construction projects. The study highlights the importance of improved cost forecasting, risk management, and stakeholder coordination to mitigate cost overruns. The outcomes of this research provide practical insights for project managers, engineers, and policymakers aiming to enhance cost efficiency in construction projects.

Keywords: Construction management, Cost overrun, Urban infrastructure, Frequency index, Severity index, Importance index

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ICSRR – E009

ERGONOMIC EVALUATION OF MANUAL REBAR BENDING OPERATIONS AND DESIGN IMPROVEMENT FOR CONSTRUCTION WORKERS

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Abstract:

Manual rebar bending is one of the most common operations performed by construction workers during reinforcement work. However, the process often requires repetitive movements, excessive force, and awkward postures, which may lead to work-related musculoskeletal disorders (WMSDs). This study evaluates the ergonomic risks associated with manual rebar bending operations and proposes design improvements to enhance worker safety and efficiency.. Ergonomic assessment was carried out using the Rapid Upper Limb Assessment (RULA) and Rapid Entire Body Assessment (REBA) methods to determine the level of musculoskeletal risk. The results indicated that workers were frequently exposed to high ergonomic risk due to continuous bending, twisting of the trunk, and repetitive arm movements. The average RULA score obtained for the existing bending method was 6, indicating that the posture requires immediate investigation and corrective changes. Similarly, the REBA assessment produced an average score of 10, which falls under the high-risk category, suggesting that prompt ergonomic intervention is necessary. Workers reported discomfort primarily in the lower back (68%), shoulders (55%), and wrists (47%), mainly due to prolonged stooping and application of high manual force during bending operations. To reduce ergonomic strain, an improved rebar bending device with an adjustable lever mechanism and optimized working height was proposed. The modified design allows workers to maintain a more neutral posture and reduces the amount of force required during bending. After implementing the improved design in a simulated working environment, the RULA score decreased from 6 to 3, and the REBA score reduced from 10 to 5, indicating a shift from high-risk to medium/low-risk ergonomic conditions. In addition, the time required for bending a single rebar decreased by approximately 22%, demonstrating improved productivity. Worker feedback also indicated a significant reduction in perceived physical strain and fatigue.

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ICSRR – E010

ML-BASED LEAF DISEASE DETECTION AND SOLUTION RECOMMENDATION

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Abstract:

Traditional plant disease detection in agriculture mainly relies on manual observation by farmers or agricultural experts. This process is time-consuming, requires specialized knowledge, and may lead to delayed diagnosis, which can reduce crop quality and yield. To address these limitations, this project presents a Machine Learning-based Leaf Disease Detection and Solution Recommendation System that automatically identifies plant diseases using leaf images and provides appropriate treatment suggestions.The proposed system operates through three main functional layers. The first layer performs image acquisition and preprocessing, where users upload leaf images through a web interface built using Python Flask. Image preprocessing techniques such as resizing, normalization, and noise removal are applied to improve image quality and prepare the data for analysis.The second layer focuses on disease detection and classification using a Convolutional Neural Network (CNN) model. CNN algorithms automatically extract important visual features from leaf images, such as color variations, spots, and texture patterns, to identify whether the leaf is healthy or affected by disease. The model is trained using a dataset containing images of healthy and diseased plant leaves to improve prediction accuracy.The final layer provides a solution recommendation module, which displays the predicted disease along with suggested treatments and preventive measures. The system is implemented using Python, TensorFlow/Keras, OpenCV, and Flask, with a simple web interface developed using HTML and CSS for easy user interaction.Experimental results show that the integration of machine learning, image processing, and web technologies enables efficient and accurate detection of plant diseases. The system supports early diagnosis, helping farmers take timely action to prevent crop damage. This project demonstrates the potential of artificial intelligence in improving agricultural monitoring and supporting smart farming practices.

Keywords: Plant Disease Detection, Machine Learning, Convolutional Neural Network, Image Processing, Smart Agriculture, Deep Learning, Flask, Crop Monitoring

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ICSRR – S011

INTEGRATED APPROACHES IN MODERN DRUG DISCOVERY

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Abstract:

Modern drug discovery has transformed from a linear, single-discipline process into a highly collaborative and multidisciplinary enterprise that integrates advances in chemistry, biology, pharmacology, computational sciences, biotechnology, and clinical medicine. The increasing complexity of diseases such as cancer, neurodegenerative disorders, metabolic syndromes, and antimicrobial resistance demands a systems-level understanding of pathophysiology and therapeutic intervention. Traditional trial-and-error methods have largely been replaced by rational drug design, target-based screening, and data-driven strategies supported by technological innovations. A critical milestone in multidisciplinary drug discovery was the completion of the Human Genome Project, which enabled the identification of novel molecular targets through genomics and proteomics approaches. Advances in medicinal chemistry facilitate structure–activity relationship optimization, while molecular biology and systems pharmacology enhance target validation and mechanistic insights. Concurrently, computational tools and artificial intelligence platforms—such as those developed by DeepMind—have revolutionized protein structure prediction, virtual screening, molecular docking, and toxicity forecasting, significantly reducing time and cost in early-stage discovery.

Keywords: Multidisciplinary research, drug discovery, artificial intelligence, medicinal chemistry, pharmacology.

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ICSRR – S012

RABIES VIRUS : PATHOGENESIS, COMPLICATIONS, VACCINE DEVELOPMENT, AND THERAPEUTIC APPROACHES

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Abstract:

Rabies is a fatal viral zoonotic disease caused by the rabies virus, which primarily affects the central nervous system of humans and other mammals. The virus is mainly transmitted through the bite or saliva of infected animals, particularly dogs. Rabies is a fatal viral disease that affects the central nervous system of humans and animals. It is caused by the rabies virus and is mainly transmitted through the bite or saliva of infected animals. After entering the body, the virus spreads through peripheral nerves to the brain, leading to severe neurological damage. The infection can cause complications such as encephalitis, paralysis, and respiratory failure. Since rabies is almost always fatal once clinical symptoms appear, early prevention is essential. Current preventive measures include effective vaccines and post-exposure prophylaxis. Therapeutic approaches mainly involve proper wound care, administration of rabies immunoglobulin, and vaccination. Continuous advancements in vaccine development and treatment strategies are important for controlling rabies and reducing its global impact.

Keywords: Rabies virus, Pathogenesis, Complications, Rabies vaccine, Therapeutic approaches**.**

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ICSRR – S013

RECENT ADVANCES IN HYPERTENSIVE THERAPY

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Abstract:

In addition to being a major risk factor for heart disease, stroke, and kidney problems, hypertension is a substantial worldwide health burden. Despite the fact that traditional antihypertensive medications, including diuretics, beta-blockers, ACE inhibitors, calcium channel blockers, and angiotensin receptor blockers, successfully lower blood pressure, problems such as resistant hypertension, side effects, and poor patient adherence still exist. Novel pharmacological treatments such as enhanced mineralocorticoid receptor antagonists, direct renin inhibitors, and angiotensin receptor–neprilysin inhibitors are the focus of recent developments in hypertension medicine. Treatment results and compliance have improved with fixed-dose combo treatments. Additionally, pharmacogenomics-supported personalized medicine techniques and device-based therapies like renal denervation are showing promise as ways to maximize the control of hypertension and enhance long-term cardiovascular outcomes.

Keywords: Hypertension, Antihypertensive therapy, Resistant hypertension, Fixed-dose combination, Renal denervation.

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ICSRR – S014

PRECISION ONCOLOGY AND PERSONALIZED MEDICINE

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Abstract:

Precision oncology and personalized medicine mark a transformative shift in modern cancer therapy. Unlike traditional approaches that rely on generalized strategies, precision oncology accounts for tumor heterogeneity and genetic variability to optimize treatment outcomes. By integrating genomic profiling, biomarker discovery, and advanced computational methods, clinicians can tailor therapies to individual patients. Technologies such as next-generation sequencing, liquid biopsy, and multi-omics analysis enable identification of molecular drivers of tumor development and progression. Targeted therapies (e.g., EGFR inhibitors) and immunotherapies (e.g., PD-1 checkpoint blockade) have improved efficacy and reduced toxicity compared with conventional chemotherapy. Artificial intelligence and machine learning further enhance clinical decision-making by deciphering complex genomic datasets. Despite these advances, clinical, economic, and computational barriers—including tumor heterogeneity, high costs of testing, and challenges in data interpretation—limit widespread adoption. Continued research, integration of emerging technologies, and expansion of biomarker-driven clinical trials will strengthen the role of precision oncology, ultimately advancing more effective, less toxic, and patient-centered cancer care.

Keywords: Precision oncology, personalized medicine, genomic profiling, biomarkers, next-generation sequencing.

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ICSRR – S015

SWARM ROBOTICS FOR HIGH-THROUGHPUT PHARMACOVIGILANCE SCREENING

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Abstract:

Traditional pharmacovigilance systems have several limitations, such as polypharmacy, misinformation, underreporting, scalability, and reporting bias. These challenges can be addressed using High-Throughput Screening (HTS) systems and artificial intelligence. But this system is centralized, which poses some challenges. To overcome those challenges, swarm-based pharmacovigilance through HTS is proposed, a decentralized multi-agent system that coordinates many simple robots to complete the task as quickly as possible. The architecture of swarm robotics contains five components. They are data ingestion, swarm agent layer, coordination and communication layer, AI analytics layer, and decision support layer. This system has advantages such as improved scalability, minimized detection time, prediction accuracy, and improved transparency that increases regulatory trust. Validation metrics such as sensitivity and specificity showed increased performance when external validation was done. Swarm-based pharmacovigilance shows a paradigm shift toward decentralized, adaptive, and intelligent pharmacovigilance.

Keywords: Decentralized system, paradigm shift, improved transparency, external validation.

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MECP2 GENE DYSFUNCTION AND EMERGING MOLECULAR THERAPEUTICS STRATEGIES IN RETT SYNDROME

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Abstract:

Rett Syndrome is a rare X-linked neurodevelopmental disorder that primarily affects females and is mainly caused by mutations in the MECP2 gene. The disorder results in neurological regression, loss of speech and motor skills, seizures, and cognitive impairment. The MECP2 gene plays a crucial role in regulating gene expression and maintaining normal neuronal function. However, recent advances in molecular biology have introduced new therapeutic approaches such as AAV-mediated gene therapy, CRISPR-based gene editing, RNA editing, and MECP2 reactivation strategies. These emerging therapies aim to restore normal gene function and may provide promising disease-modifying treatments for Rett syndrome in the future. This chapter explores the molecular mechanisms of MECP2 dysfunction and highlights current and emerging therapeutic strategies with potential to transform the management of Rett syndrome.

Keywords: Rett Syndrome; MECP2 Gene Mutation; Neurodevelopmental Disorder; Neuronal Dysfunction; Gene Therapy;

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STEM CELL THERAPY IN THE TREATMENT OF DIABETIC NEPHROPATHY

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Abstract:

Diabetic nephropathy (DN) is one of the most serious complications of diabetes mellitus and a leading cause of end-stage renal disease (ESRD) worldwide. Current therapeutic strategies mainly focus on controlling blood glucose levels and slowing disease progression, but they are often unable to completely prevent renal damage. In recent years, stem cell–based therapy has emerged as a promising approach for the treatment of DN. Among the different types of stem cells, mesenchymal stem or stromal cells (MSCs) have gained considerable attention due to their regenerative potential, immunomodulatory properties, and ability to promote tissue repair. Several preclinical studies and early-phase clinical trials have demonstrated that MSC therapy may improve renal function, reduce inflammation, and inhibit fibrosis in diabetic kidneys. The therapeutic effects of MSCs are mainly attributed to their paracrine signaling, anti-inflammatory activity, and capacity to enhance cellular regeneration. This chapter reviews the recent advances in MSC-based therapy for diabetic nephropathy, highlighting the underlying mechanisms involved in renal protection and repair. In addition, the potential benefits, limitations, and possible risks associated with MSC therapy are discussed. Understanding these mechanisms may contribute to the development of novel therapeutic strategies and drug targets for the effective management of diabetic nephropathy.

Keywords: Diabetic nephropathy, Diabetes mellitus, End-stage renal disease, Stem cell therapy, Mesenchymal stem cells.

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ICSRR – S018

PHARMACOVIGILANCE IN HERBAL AND TRADITIONAL MEDICINES: CHALLENGES AND FUTURE PERSPECTIVES

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Abstract:

In recent years, the use of traditional and herbal medicines has gradually increased worldwide. Many people believe that natural products are safe; however, scientific reports indicate that herbal medicines can also cause harmful effects, side effects, toxicity, and interactions with other drugs. For this reason, pharmacovigilance plays an important role in ensuring and monitoring their safety. Herbal medicines are natural-based medicinal products obtained from plants, including roots, leaves, bark, seeds, or extracts, and are widely used in traditional systems. Most of these products are available without prescription and are frequently used for self-medication. In many cases, patients may use these products without consulting healthcare professionals or combine them with modern medications. Herbal products may produce adverse drug reactions such as liver damage, kidney problems, allergic reactions, and bleeding problems. Major concerns include wrongly identified plants, variation in product quality, contamination, and adulterated drugs. Improving awareness among healthcare professionals and the public can help strengthen safety monitoring.

Keywords: Pharmacovigilance; Herbal and traditional medicines; Adverse drug reactions; Drug interactions; Quality control; Safety monitoring.

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ICSRR – S019

IMPACT OF NEW ORAL GLP-1 DRUGS ON DIABETES TREATMENT

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Abstract:

Type 2 diabetes mellitus is a chronic metabolic disorder recognized by insulin resistance and progressive β-cell impairment, leading to prolonged hyperglycemia and increased risk of cardiovascular and metabolic complications, the incretin system mainly, GLP-1 and GIP which plays an important role in regulating postprandial blood glucose levels.GLP-1RAs are therapeutically effective antidiabetic agents that improve glucose-dependent insulin secretion, suppress release of glucagon, delays gastric emptying and promotes satiety, thereby improve glycemic control and assisting weight reduction. Traditionally, these therapies are available only in injectable form, which sometimes affect patient treatment compliance. The development of oral GLP-1 receptor agonists, such as oral semaglutide, represents a major advancement in diabetes treatment. This formulation uses the absorption enhancer that is (sodium N-(8-[2-hydroxybenzoyl] amino) caprylate) to improve absorption in GIT. Advancing oral GLP-1 receptor agonists on small molecules are being studied and may make treatment of diabetes easier, more effective and help patients take their medicines regularly.

Keywords: GLP-1 Receptor Agonists, Oral semaglutide, Incretin system, Glycemic control, Antidiabetic Therapy.

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ICSRR – S020

CRISPR-CAS9 GENOME EDITING IN ZEBRAFISH FOR MODELING HUMAN DISEASES: A NARRATIVE REVIEW

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Abstract:

Genome editing technologies have come a long way in terms of modern biological research by now allowing precise modification of genetic material. Various tools are under review, among which, CRISPR-Cas9 has emerged as one of the most efficient and widely used systems. This is due to its simplicity, The zebrafish, Danio rerio, has become a prominent vertebrate model for genetic studies because of its rapid embryonic development, optical transparency, and strong genetic similarity to humans. In recent years, CRISPR-Cas9 has been extensively applied in zebrafish to investigate gene function, generate targeted mutations, and establish models of human disease. This review summarizes the fundamental principles of CRISPR-Cas9–mediated genome editing and discusses its application in zebrafish research. Particular emphasis is placed on experimental workflows, including guide RNA design, embryo microinjection, and mutant screening strategies. In addition, the review highlights major research applications such as functional genomics, disease modeling, and drug discovery. Despite its numerous advantages, certain technical challenges, including off-target effects and mosaic mutations, remain important considerations. Continued improvements in genome editing strategies are expected to further enhance the utility of zebrafish as a model system for biomedical research. Overall, the integration of CRISPR-Cas9 technology with zebrafish biology provides a powerful platform for understanding gene function and advancing studies related to human health and disease.

Keywords: CRISPR; CRISPR-Cas9; genome; zebrafish; modification; genome editing.

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ICSRR – S021

FABRY DISEASE: MOLECULAR MECHANISMS AND EMERGING THERAPEUTIC APPROACHES

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Abstract:

Fabry Disease is a rare X-linked inherited metabolic disorder caused by mutations in the *GLA* gene, which result in deficient activity of the lysosomal enzyme α-galactosidase A. The enzymatic deficiency leads to progressive accumulation of glycosphingolipids, particularly globotriaosylceramide (Gb3), within lysosomes of various cell types. This accumulation contributes to multisystem involvement affecting the kidneys, heart, nervous system, and skin. Clinical manifestations may include neuropathic pain, angiokeratomas, renal dysfunction, cardiomyopathy, and cerebrovascular complications. Due to the variability of symptoms and lack of awareness, the disease is frequently underdiagnosed, especially in developing countries. Advances in molecular biology have improved the understanding of the underlying pathogenic mechanisms and facilitated the development of targeted therapeutic strategies. Current treatment primarily involves enzyme replacement therapy aimed at restoring α-galactosidase A activity and reducing substrate accumulation. In addition, emerging therapeutic approaches such as pharmacological chaperone therapy, gene therapy, and substrate reduction therapy are being investigated to provide more effective and long-term management options. This chapter discusses the molecular mechanisms underlying Fabry disease, its clinical manifestations, diagnostic approaches, and recent advances in therapeutic strategies, highlighting future perspectives for improved patient outcomes.

Keywords: Fabry disease, α-galactosidase A deficiency, globotriaosylceramide (Gb3), enzyme replacement therapy, gene therapy.

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ICSRR – S022

PHARMACOGNOSY OF MEDICINAL PLANTS: PHYTOCHEMICAL PROFILING AND THERAPEUTIC APPLICATIONS

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Abstract:

Medicinal plants remain a cornerstone of global healthcare systems, contributing significantly to both traditional medicine and modern drug discovery. According to the World Health Organization, nearly 80% of the world's population relies on plant-based medicines for primary healthcare needs. More than 25% of modern pharmaceutical drugs are derived directly or indirectly from plant sources, and approximately 50,000–70,000 plant species are estimated to be used medicinally worldwide. Pharmacognosy, the study of crude drugs obtained from natural sources, integrates botanical, chemical, and pharmacological approaches to identify bioactive compounds and validate therapeutic claims. This chapter presents a comprehensive overview of pharmacognosy with emphasis on phytochemical profiling techniques and their therapeutic applications. Quantitative data on phytochemical classes, extraction efficiencies, and bioactivity correlations are discussed. Advanced analytical tools such as chromatography and spectroscopy have enabled precise characterization of secondary metabolites, accelerating the development of plant-based therapeutics. The chapter also highlights challenges, sustainability concerns, and future prospects in medicinal plant research.

Keywords: Pharmacognosy, Medicinal Plants, Phytochemical Profiling, Bioactive Compounds, Therapeutic Applications.

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ICSRR - M023

RECONCEPTUALIZING SERVICE EXCELLENCE THROUGH SUSTAINABILITY: A THEORETICAL INTEGRATION OF HOSPITALITY VALUES AND RESPONSIBLE MANAGEMENT

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Abstract:

In the hospitality and catering domain, service excellence has traditionally been treated as a function of meeting and exceeding guest expectations through reliability, responsiveness, assurance, empathy, and tangibles. However, a new paradigm is emerging: the integration of sustainability principles into service delivery, thereby reconceptualizing service excellence as not only guest-centered but planet-and-people-centered as well. This chapter develops a theoretical framework that brings together hospitality values (service quality, guest orientation, and organizational culture) and responsible management sustainability, corporate social responsibility, and ethical leadership. It argues that the experienced service excellence of a hotel or catering business is enhanced when sustainable practices are embedded into operational, human-resource, marketing, and service-leadership processes. Drawing on recent literature on service quality and sustainability in hospitality, the chapter identifies key constructs and relationships: sustainable human resource practices, green operational systems, service climate, guest perceptions of sustainability, and financial as well as relational outcomes. The chapter proposes a model in which sustainability-integrated service excellence leads to improved guest satisfaction, loyalty, brand image, and business performance. Implications for researchers and managers are discussed, together with directions for future research. This reconceptualized view offers hospitality educators, managers, and policymakers a holistic lens for aligning service excellence with sustainable development imperatives.

Keywords: Service Excellence; Sustainability; Hospitality Values; Responsible Management; Service Quality.

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ICSRR - M024

THE TRIPLE BOTTOM LINE IN HOSPITALITY: BALANCING PEOPLE, PLANET, AND PROFIT IN SERVICE OPERATIONS

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Abstract:

The Triple Bottom Line (TBL) framework, encompassing people, planet, and profit, has emerged as a critical model for sustainable performance in the hospitality industry. Hotels, resorts, and catering operations are increasingly expected to demonstrate economic viability, social responsibility, and environmental stewardship simultaneously. This chapter examines the operationalization of TBL in hospitality, analyzing the mechanisms by which organizations measure and balance financial performance, social impact, and ecological sustainability. Drawing from recent scholarly research, the chapter identifies key performance indicators across the three TBL dimensions, including employee well-being, guest satisfaction, community engagement, energy efficiency, waste management, and revenue growth. A conceptual framework is proposed to illustrate the dynamic interplay between these dimensions, highlighting trade-offs, synergies, and strategic alignment opportunities. Findings suggest that hotels integrating TBL principles achieve superior guest loyalty, brand equity, operational efficiency, and long-term resilience. Practical implications for managers, policymakers, and hospitality educators are discussed, along with directions for future research to refine TBL measurement and implementation strategies. By adopting a holistic TBL perspective, hospitality organizations can move beyond traditional financial metrics to create enduring value for stakeholders, communities, and the environment.

Keywords: Triple bottom line, sustainability, hospitality operations, social responsibility, environmental.

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ICSRR - M025

ETHICAL LEADERSHIP AND ORGANIZATIONAL COMMITMENT: DRIVERS OF SUSTAINABLE SERVICE CULTURE IN HOTELS

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Abstract:

The role of ethical leadership in shaping a sustainable service culture within the hospitality industry has gained considerable attention. This chapter investigates the interplay between leadership behavior, employee empowerment, and psychological ownership in driving sustainable service practices in hotels. Ethical leaders are instrumental in creating an environment of trust, transparency, and fairness, which encourages employees to take ownership of service quality and sustainability initiatives. Drawing from recent empirical and conceptual studies (2020–2025), the chapter examines how ethical leadership influences organizational commitment, employee engagement, and service excellence and how these factors collectively foster a culture that supports environmental stewardship and social responsibility. A conceptual model is proposed linking ethical leadership, psychological ownership, employee empowerment, and sustainable service outcomes. The findings indicate that hotels demonstrating strong ethical leadership experience higher levels of employee commitment, proactive service behaviors, and alignment with sustainability objectives. Practical implications for hotel managers, HR practitioners, and policymakers are discussed, highlighting strategies for embedding ethical practices into leadership development programs and operational policies. The chapter also identifies avenues for future research, including cross-cultural comparisons, longitudinal studies, and the impact of digital leadership tools. By fostering an ethically grounded, psychologically empowered workforce, hotels can cultivate a sustainable service culture that balances profitability with social and environmental responsibility, ensuring long-term operational resilience and stakeholder satisfaction.

Keywords: Ethical leadership; organizational commitment; employee empowerment; psychological ownership; sustainable service culture.

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ICSRR - M026

ECO-EFFICIENCY IN HOTEL OPERATIONS: OPERATIONAL STRATEGIES FOR RESOURCE OPTIMIZATION AND WASTE REDUCTION

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Abstract:

Eco-efficiency has emerged as a pivotal strategy for achieving sustainability in hotel operations, emphasizing the simultaneous reduction of environmental impacts and operational costs. This chapter explores practical interventions in front office, housekeeping, and maintenance departments aimed at enhancing resource efficiency and minimizing waste. Drawing upon recent scholarly research, the chapter identifies operational strategies such as energy and water conservation, sustainable procurement, waste segregation, and digital monitoring systems that enable hotels to optimize processes while maintaining service quality. A conceptual framework illustrates how eco-efficiency initiatives intersect with operational practices, employee engagement, and guest satisfaction. Case studies and empirical findings highlight measurable outcomes, including reduced utility consumption, lower operational costs, and improved environmental performance. The chapter underscores the role of cross-departmental collaboration, staff training, and technological integration in embedding eco-efficiency into daily hotel operations. Practical implications provide actionable guidance for hotel managers and sustainability officers seeking to implement resource optimization programs. By adopting eco-efficient practices, hotels can achieve a triple benefit: economic savings, environmental stewardship, and enhanced guest experience, aligning operational excellence with sustainable development objectives.

Keywords: Eco-efficiency; hotel operations; resource optimization; waste reduction; sustainable.

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ICSRR - M027

SUSTAINABILITY IN FOOD AND BEVERAGE OPERATIONS: FROM FARM-TO-FORK TO ZERO-WASTE KITCHENS

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Abstract:

Sustainability in food and beverage (F&B) operations has become a crucial aspect of responsible hospitality management, encompassing sustainable sourcing, waste minimization, and green production methods. This chapter explores the strategies and practices that enable hotels and catering services to adopt a farm-to-fork approach while achieving zero-waste objectives. Drawing upon recent scholarly research, the chapter highlights sustainable procurement practices, such as local and organic sourcing, supplier evaluation, and eco-certifications, that reduce environmental impacts and support local communities. Operational interventions in F&B production, including energy-efficient kitchen equipment, smart portioning, and food recycling systems, are examined to demonstrate how resource efficiency can coexist with high-quality service. Waste management strategies, encompassing composting, donation programs, and circular economy principles, are analyzed to illustrate practical pathways to zero-waste kitchens. The chapter also emphasizes the role of staff training, guest engagement, and technology in implementing sustainable practices. A conceptual framework links sustainable sourcing, production, and waste management to operational outcomes, cost efficiency, and environmental performance. By adopting farm-to-fork and zero-waste strategies, F&B operations can achieve triple benefits: economic savings, environmental stewardship, and enhanced guest satisfaction. The chapter concludes with practical recommendations for hotel managers, catering operators, and policymakers aiming to embed sustainability into everyday F&B operations.

Keywords: Sustainability; farm-to-fork; zero-waste kitchens; food and beverage operations; green production.

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ICSRR - M028

HOUSEKEEPING AND ENVIRONMENTAL STEWARDSHIP: GREEN PRACTICES FOR OPERATIONAL EXCELLENCE

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Abstract:

Housekeeping operations are central to hotel sustainability, as they consume significant resources such as water, energy, and cleaning chemicals. This chapter examines eco-cleaning, laundry management, and linen reuse programs as practical models for environmental stewardship in hotels and catering services. Drawing on recent scholarly research, the chapter highlights strategies that reduce resource consumption while maintaining high standards of cleanliness and guest satisfaction. Eco-cleaning practices, including the use of biodegradable detergents and environmentally friendly cleaning technologies, minimize chemical pollution and improve indoor air quality. Laundry management strategies, such as optimized washing schedules, energy-efficient machines, and water recycling, reduce utility costs and carbon footprint. Linen reuse and rotation programs encourage responsible consumption, reduce laundering frequency, and engage guests in sustainability initiatives. A conceptual framework illustrates the relationship between housekeeping interventions, operational efficiency, and environmental outcomes. The chapter emphasizes the role of staff training, cross-departmental collaboration, and technological tools in embedding sustainability into daily operations. Case studies demonstrate measurable improvements in resource efficiency, waste reduction, and guest perception of sustainability practices. By adopting green housekeeping practices, hotels can achieve triple benefits: operational excellence, cost savings, and environmental responsibility, contributing to a sustainable hospitality culture and long-term competitive advantage.

Keywords: Housekeeping sustainability; eco-cleaning; laundry management; linen reuse; green hospitality.

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ICSRR - M029

GREEN HUMAN RESOURCE MANAGEMENT IN HOSPITALITY: BUILDING EMPLOYEE COMMITMENT TO SUSTAINABLE PRACTICES

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Abstract:

Green human resource management integrates environmental sustainability into HR policies and practices, enabling hotels and catering services to align workforce management with organizational sustainability goals. This chapter explores recruitment, training, and retention strategies that foster employee commitment to sustainable practices in the hospitality sector. Drawing on recent scholarly research, it highlights strategies for attracting environmentally conscious employees, embedding sustainability into training and development programs, and retaining staff through recognition, engagement, and career development initiatives. GHRM practices examined include green recruitment and selection, sustainability-oriented onboarding, continuous learning programs, performance management with sustainability metrics, and employee involvement in eco-initiatives. The chapter presents a conceptual framework linking GHRM interventions to employee behavior, organizational commitment, and sustainability outcomes, emphasizing the mediating role of psychological ownership, environmental awareness, and empowerment. Empirical evidence demonstrates that hotels implementing GHRM achieve enhanced employee motivation, reduced turnover, and improved environmental performance, while promoting a culture of responsible hospitality. By adopting GHRM strategies, hospitality organizations can cultivate a workforce that actively participates in sustainability initiatives, contributing to operational efficiency, environmental stewardship, and long-term competitive advantage.

Keywords: Green Human Resource Management; sustainability in hospitality; employee commitment; eco-training; retention strategies.

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ICSRR - M030

EMPOWERING EMPLOYEES FOR SUSTAINABLE SERVICE DELIVERY: A PSYCHOLOGICAL PERSPECTIVE

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Abstract:

Employee empowerment is a critical driver of sustainable service delivery in hotels and catering operations. This chapter examines how empowerment, motivation, and psychological ownership influence sustainable guest service behaviour, linking human resource strategies to environmental and operational outcomes. Drawing on recent scholarly research (2020–2025), it highlights mechanisms through which hotels can enhance employee autonomy, engagement, and proactivity to foster a culture of responsible service delivery. Empowerment strategies include delegated decision-making, skill development, participatory planning, and recognition programs. Motivation is analyzed through intrinsic and extrinsic factors, including sustainability incentives, career growth opportunities, and organizational support. Psychological ownership, defined as the sense of personal responsibility and identification with organizational goals, mediates the relationship between empowerment and sustainable service behaviour. Case studies demonstrate that empowered employees not only adhere to eco-friendly operational practices but also contribute innovative solutions to reduce waste, conserve energy, and enhance guest satisfaction. The chapter proposes a conceptual framework linking empowerment, motivation, and psychological ownership to sustainable service outcomes, emphasizing the integration of human psychology and operational sustainability. By fostering empowered and motivated employees, hospitality organizations can achieve sustainable service excellence, operational efficiency, and environmental stewardship, creating long-term value for both the organization and its stakeholders.

Keywords: Employee empowerment; sustainable service; psychological ownership; motivation; hospitality operations.

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ICSRR - M031

TRAINING FOR TRANSFORMATION: DEVELOPING SUSTAINABILITY COMPETENCIES AMONG HOSPITALITY PROFESSIONALS

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Abstract:

Training is a critical enabler for integrating sustainability into hospitality operations. This chapter examines frameworks for sustainability-oriented training aimed at developing competencies among hotel and catering professionals to enhance service quality and operational sustainability. Drawing on recent research (2020–2025), it highlights methods for equipping employees with knowledge, skills, and attitudes necessary to implement environmentally responsible practices across front office, housekeeping, food and beverage, and maintenance operations. The chapter analyzes competency-based training frameworks, including modular curricula, experiential learning, simulations, and technology-enhanced methods. It emphasizes the role of continuous professional development, assessment, and feedback in reinforcing sustainability behaviors and improving service standards. Case studies from leading hospitality organizations illustrate the impact of structured training programs on resource optimization, waste reduction, guest satisfaction, and employee engagement. The chapter also discusses challenges and best practices in aligning training programs with organizational sustainability goals and performance evaluation systems. A conceptual model is proposed linking sustainability training, competency development, and improved service quality outcomes. By fostering a workforce equipped with sustainability competencies, hospitality organizations can achieve operational efficiency, environmental responsibility, and enhanced guest experiences, contributing to long-term competitive advantage and sector-wide transformation.

Keywords: Sustainability training; hospitality competencies; service quality; experiential learning; employee development.

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ICSRR - M032

GREEN MARKETING AND CONSUMER PERCEPTION: COMMUNICATING SUSTAINABILITY IN HOSPITALITY BRANDS

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Abstract:

Green marketing is an essential strategy for hospitality organizations seeking to communicate their sustainability initiatives to guests while building brand loyalty and positive consumer perception. This chapter explores how hotels and catering services implement green marketing strategies to influence guest attitudes, decision-making, and loyalty. Drawing on research from 2020–2025, it examines communication channels, messaging strategies, eco-labeling, and promotional campaigns that effectively highlight sustainable practices. The chapter discusses guest perceptions of authenticity, credibility, and value alignment, which significantly impact their purchase behavior, repeat visits, and advocacy for sustainable brands. Empirical evidence demonstrates that consumers increasingly prefer eco-conscious hospitality providers and are willing to pay a premium for verified green services. Case studies from leading global and regional hotels illustrate the effectiveness of integrating green marketing with operational sustainability initiatives. The chapter also analyzes challenges in avoiding greenwashing, maintaining transparency, and aligning marketing messages with actual practices. A conceptual framework is proposed linking green marketing communications, consumer perception, and brand loyalty, emphasizing the strategic role of marketing in promoting sustainability within hospitality. By effectively communicating sustainability, hotels can enhance guest engagement, operational impact, and competitive advantage, while fostering responsible consumption behaviors among customers.

Keywords: Green marketing; consumer perception; sustainability communication; hospitality branding; brand.

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ICSRR - S033

AI-DRIVEN MICROBIOME PROFILING FOR PRECISION MANAGEMENT OF INFLAMMATORY BOWEL DISEASE

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Abstract:

Inflammatory bowel disease, or IBD, comprises crohn's disease and ulcerative colitis, chronic inflammatory disorders mediated by alterations in the human microbiome. Recent studies indicate that imbalance in the microbiome significantly contributes to disease severity and treatment response in IBD patients. In the current era of next-generation sequencing and other omics-based approaches, artificial intelligence, or AI, has been successfully applied to analyze the human microbiome data to identify specific microbial patterns to aid in the diagnosis of IBD, disease classification, and prediction of treatment outcomes. In addition, non-invasive biomarker discovery through stool samples of affected individuals can be achieved, thus enabling a more precise approach to disease management in IBD patients. Though there are certain limitations in applying AI in microbiome analysis, including data variation and validation, this approach appears to be a promising area of research to improve diagnosis, disease relapse, and treatment of IBD, thus enabling a more precise approach to disease management in affected individuals.

Keywords: Inflammatory Bowel Disease, Artificial Intelligence, Gut Microbiome, Microbiome Profiling, Precision Medicine.

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ICSRR - S034

BIODEGRADABLE POLYMERS AND ECO-FRIENDLY EXCIPIENTS IN PHARMACEUTICAL DRUG DELIVERY SYSTEMS

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Abstract:

Biodegradable polymers play a vital role in modern pharmaceutical and medical device development due to their ability to safely degrade within the body, eliminating the need for surgical removal. Polymers such as PLA, PGA, and PLGA are widely used in absorbable sutures, orthopedic devices, and advanced drug delivery systems, including implants, microspheres, nanoparticles, and in situ gels. Their degradation occurs through bulk or surface erosion, enabling controlled and sustained drug release. This chapter outlines the classification, chemistry, synthesis, and mechanisms of polymer degradation, along with formulation techniques such as single and double emulsification methods. It also discusses scale-up strategies, quality control measures, regulatory considerations, and economic perspectives.

Keywords: PLA, PGA, PLGA, microspheres, nanoparticles.

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ICSRR - S035

DENDRIMERS: A NEW CLASS OF NANOPOLYMERS

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Abstract:

Dendrimers are nanosized, radially symmetrical molecules that possess a well-defined, uniform, and monodisperse structure. They generally consist of a central core, an inner branching layer, and an outer functional surface. Traditional macromolecular architectures often produce polydisperse molecules with different molecular weights, whereas dendrimers provide a more controlled structure. Various types of dendrimers have been developed, exhibiting biological properties such as polyvalency, self-assembly, electrostatic interactions, chemical stability, low cytotoxicity, and good solubility. Due to these unique properties, dendrimers have gained significant attention in the medical field. This review highlights the different applications of dendrimers in medicine and drug delivery.

Keywords: Dendrimers, polydisperse, solubility, medicine, drug delivery.

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ICSRR - S036

DEVELOPMENT AND TECHNOLOGY OF MRNA VACCINES AND THERAPEUTICS BEYOND COVID-19

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Abstract:

This study is based on the application of mRNA vaccines for the treatment of various infectious diseases and different cancer types. An mRNA vaccine is a new type of vaccine that introduces cells into the human body that produce harmless protein to trigger the immune system to develop immunity-producing antibodies against antigens. These vaccines were developed after the global outbreak of COVID-19. This significantly helped the scientists to invent vaccines in a short period of time compared to the traditional vaccines. The main role is to reduce the death rate by controlling the spread of disease. In the case of cancer, mRNA vaccines help the immune system to recognize and destroy the cancer cells by producing the tumor-specific antigens. In order to create targeted mRNA technology, including its applications in vaccines, immunotherapies, protein replacement therapy, and genome editing as well as its distribution to particular cell types and organs.

Currently researchers are in their role to treat lung cancer, breast cancer, and so on by providing personalized treatments. Since the mRNA vaccines do not contain live pathogens, they are safer to use and offer a promising future for cancer treatment.

Keywords: *mRNA vaccines, immunogenicity, antibodies, COVID-19, cancer immunotherapy.*

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ICSRR - S037

LIPOSOMES: A NOVEL DRUG DELIVERY SYSTEM

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Abstract:

Liposomes are microscopic vesicular structures composed mainly of phospholipids and cholesterol that form bilayer membranes similar to those found in biological cells. These vesicles are widely used as carriers for drug delivery in pharmaceutical research because of their ability to encapsulate both hydrophilic and lipophilic drugs. Liposomes protect the incorporated drug molecules from degradation and enhance their stability in biological environments. They also improve the therapeutic efficiency of drugs by delivering them to specific tissues or organs while minimizing harmful side effects. Due to their biocompatibility, biodegradability, and versatility, liposomes are considered an important component of modern drug delivery systems. They can be administered through different routes, including oral, topical, intravenous, nasal, ocular, and transdermal routes. Liposomal formulations are widely used in the treatment of cancer, infections, and other diseases. In addition, liposomes are used in vaccine development, gene delivery, and cosmetic formulations. The development of liposomal drug delivery systems has significantly improved the effectiveness and safety of many pharmaceutical products.

Keywords: *Liposomes, Drug Delivery, Phospholipids, Cholesterol, Vesicles, Targeted Therapy.*

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ICSRR - S038

ADVANCES IN NOVEL DRUG DELIVERY SYSTEMS: MECHANISMS, APPLICATIONS AND COMMERCIAL ASPECTS

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Abstract:

The novel drug delivery system is an advanced technology or formulation approach designed to transport pharmaceutical compounds into the body more safely and effectively than conventional methods (like tablets or injections). Key goals include controlling the rate of release, improving drug targeting to specific tissues, and enhancing bioavailability. The performance of an existing medicinal molecule in terms of patient compliance, safety, and efficacy can be greatly enhanced by evolving it from a traditional form to a unique delivery mechanism. An old medication molecule can be given new life as a novel drug delivery system. The limitations of the conventional drug delivery methods are addressed by the innovative drug delivery system, which is a novel method of drug administration. A significant improvement in the ability to release a drug at a specified spot and rate is possible with a novel drug delivery system that is properly developed. Pharmaceutical companies are working to create novel drug delivery systems in order to give medications to patients effectively and with fewer side effects. NDDS include carrier-based systems such as liposomes, nanoparticles, microspheres, niosomes, solid lipid nanoparticles, and polymeric systems, as well as non-carrier-based approaches. The integration of nanotechnology and controlled-release strategies has significantly enhanced therapeutic efficacy while reducing toxicity and side effects. This review highlights the principles, advantages, disadvantages, approaches, and applications of novel drug delivery systems, emphasizing their role in modern pharmaceutical research and future therapeutic development.

Keywords: *Pharmaceutical companies, Pharmacokinetics, Nanoparticles, Bioavailability, Phytopharmaceutical.*

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ICSRR - S039

ORAL NOISOME AND PRONIOSOMES: MECHANISTIC INSIGHTS, FORMULATION STRATEGIES, AND THERAPEUTIC APPLICATIONS IN ENHANCING BIOAVAILABILITY AND TARGETED DRUG DELIVERY

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Abstract:

Oral drug delivery is still the easiest and most popular way to take medicine, but it comes with a lot of problems. Some drugs just don't dissolve well in water, or they can't pass through the gut easily. Others break down because of enzymes or get wiped out by first-pass metabolism, so the body barely absorbs them, and they don't work as well as they should. That's where vesicular systems like liposomes and their dry forms, proniosomes, come in. These carriers, made from non-ionic surfactants and cholesterol, protect drugs from breaking down in the digestive tract and let the medicine release slowly over time. How you put these together really matters. Things like the type of surfactant, how much cholesterol you use, the size of the vesicles, and their surface charge—all these affect how much of the drug gets into your system and how quickly. Modifying the surface, say by adding PEG or coating with chitosan, helps the drug stick to mucosal surfaces, improves how well it passes through, and makes it tougher against enzymes. Drugs get absorbed better thanks to things like increased endocytosis, tweaks to tight junctions, and transport through the lymphatic system. This review digs into how these vesicular systems are designed, how they help drugs get absorbed, what you need to look for when testing them, and what it takes to actually use them in real-world treatments.

Keywords: Niosomes, proniosomes, oral bioavailability, vesicular drug delivery, lymphatic transport.

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ICSRR - S040

ORAL ULCERS: IN CLINICAL ASPECTS

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Abstract:

Oral ulcers are generally painful lesions that are related to various conditions developing within the oral cavity. They can be classified as acute or chronic according to their presentation and progression. Acute oral ulcers are associated with conditions such as trauma, recurrent aphthous stomatitis, Behcet's disease, bacterial and viral infections, allergic reactions, or adverse drug reactions. Chronic oral ulcers are associated with conditions such as oral lichen planus, pemphigus vulgaris, mucosal pemphigoid, lupus erythematosus, mycosis, and some bacterial and parasitic diseases. The correct differential diagnosis is necessary to establish the appropriate treatment, taking into account all the possible causes of ulcers in the oral cavity. In this second part of this two-part review, chronic oral ulcers are reviewed

Keywords: *Chronic oral ulcers, acute oral ulcers, bacterial, parasitic diseases.*

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ICSRR - S041

PHYTOSOMES IN NOVEL DRUG DELIVERY SYSTEM

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Abstract

Herbal products have shown a wide range of therapeutic benefits in the management of many health conditions. However, the clinical effectiveness of several phytoconstituents is often limited because of poor solubility, low absorption, instability, and reduced bioavailability. These limitations restrict the efficient delivery of plant-derived compounds in the body. To overcome such challenges, novel drug delivery systems have been developed, among which phytosomes have emerged as a promising approach. Phytosomes are complexes formed between plant active constituents and phospholipids, commonly phosphatidylcholine, which improve the lipid compatibility and membrane permeability of herbal compounds. This interaction facilitates better absorption through biological membranes and enhances overall bioavailability. Phytosomal systems also provide improved stability and protect phytochemicals from degradation, resulting in enhanced therapeutic performance when compared with conventional herbal extracts. Studies reported in scientific databases such as PubMed, Scopus, Web of Science, and Google Scholar highlight the growing importance of phytosomes as an effective nanocarrier system. In comparison with other delivery systems like liposomes, phytosomes demonstrate improved pharmacokinetic properties and distribution efficiency. They can be administered through various routes, including oral, topical, and intranasal delivery. Because of these advantages, phytosomes are being widely explored for applications in inflammatory disorders, metabolic diseases, neurological conditions, liver disorders, and cancer therapy.

Keywords : *Phytosomal drug delivery, Herbal bioactive compounds, Phospholipiphytoconstituent complex, Enhanced bioavailability, Nanocarrier systems.*

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ICSRR - S042

PREFORMULATION STUDIES IN FORMULATION OF NEW DOSAGE FORMS

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Abstract:

Preformulation studies are a crucial step in pharmaceutical development, focusing on evaluating the physical, chemical, and biopharmaceutical properties of a drug to design safe, stable, and effective dosage forms. Emerging with advances in physical pharmacy, these studies transformed drug formulation from an empirical practice to a scientific process. Key parameters assessed include crystal structure, polymorphism, solubility, partition coefficient, particle size, density, hydrolysis, oxidation, racemization, and polymerization. The Biopharmaceutics Classification System (BCS) classifies drugs based on solubility and permeability, guiding bioequivalence and regulatory decisions. Preformulation data support excipient selection, manufacturing methods, packaging, and stability assessment. Overall, these studies form the foundation for developing bioavailable, stable, and therapeutically effective pharmaceutical products while ensuring quality, safety, and efficient large-scale production.

Keywords: *Preformulation, biopharmaceutics, physicochemical, stability, manufacturing, packaging.*

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ICSRR - S043

DEVELOPMENT AND EVALUATION OF A PROLONGED-RELEASE AMLA FORMULATION FOR LONG-TERM PREVENTION OF SCURVY

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Abstract:

Scurvy is the nutritional condition marked by symptoms like bleeding gums, exhaustion, poor wound healing and anemia, is caused by long-term vitamin C deficiency. Amla (Emblica officinalis) as potent antioxidant qualities and is a well known natural source of ascorbic acid (vitamin C). However, in order to maintain therapeutic levels ascorbic acid (vitamin C) must be administered frequently due to its short biological half-life and poor stability. In order to provide prolonged vitamin C delivery for the long-term prevention of scurvy, the current study intends to develop and assess a sustained-release formulation of amla extract. In this study, a sustained-release hydrogel containing amla extract was created using sodium alginate and carbopol 934 as polymers. In order to improve gel strength and control the drug release profile, calcium chloride was used as a cross-linking agent. The stability, in vitro drug release, drug content, swelling behavior and gel strength of the prepared formulation were assessed. The outcomes show controlled and prolonged release of vitamin C over a long period of time, demonstrating effective sustained-release characteristics. According to stability studies, the formulation held up well under certain storage circumstances. Therefore, a promising natural and patient-friendly method for sustaining therapeutic ascorbic acid (vitamin C) levels and preventing scurvy over and extended period of time is offered by the developed sustained-release amla formulation.

Keywords: Emblica officinalis, Ascorbic acid (vitamin C), Wound healing, Sustained release formulation, Antioxidant activity.

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ICSRR – E044

MECHANICAL AND TRIBOLOGICAL CHARACTERIZATION OF NATURAL FILLER REINFORCED VINYL ESTER COMPOSITES: A REVIEW

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Abstract:

Vinyl ester (VE) resin has recently become one of the top finishing and strength matrices for composite manufacturing due to its outstanding chemical resistance, very low moisture absorption (~0.15%), and great mechanical response. Using natural fillers including plant fibers, agricultural wastes, and mineral particles, helps not only improve the composite's performance but also make it environmentally friendly. This paper highlights the different mechanical and tribological properties of vinyl ester composites reinforced with natural fillers that have been reported in the literature. The main findings indicate that tensile strengths range have been recorded between 55 and 80 MPa, while flexural strengths range from 89 to 136 MPa, with both depending primarily on the type of filler used, the amount of filler added, and the surface treatment of the filler. Regarding tribological properties, extremely low wear rates, i.e. 2.41 × 10^{-4} mm^3/Nm and the friction coefficients ranging from 0.35 to 0.51. Interfacial adhesion behavior has been studied along with wear mechanisms and surface characteristics to bring together the main research issues that have to be addressed and the opportunities that arise.

Keywords: natural filler, tribological properties, vinyl ester composites, glass fiber, stiffness.

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ICSRR – S045

ASSESSMENT OF GROUNDWATER QUALITY INVOLVES THE EVALUATION OF PHYSICAL, CHEMICAL, AND BIOLOGICAL PARAMETERS OF GROUNDWATER

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Abstract

Groundwater is a vital freshwater source, supplying drinking water to nearly half the global population and supporting agriculture and industry. Despite subsurface filtration, its quality is influenced by geology, hydrochemistry, and human activities. This chapter covers groundwater quality concepts, controlling factors, contaminants, assessment techniques, standards, and management strategies. It concludes with emerging issues and protection measures. Key to understanding sustainability. Groundwater management is crucial for ecosystems and humans. Quality impacts health and livelihoods. Effective strategies ensure its preservation. A critical resource needs careful management.

Keywords: Groundwater quality, hydrogeochemistry, contamination, aquifer, water quality standards, groundwater management.

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ICSRR – E046

MACHINE LEARNING APPLICATIONS IN SMART MANUFACTURING AND MECHANICAL ENGINEERING: A REVIEW

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Abstract

Machine learning (ML) has emerged as a transformative technology in smart manufacturing and mechanical engineering, enabling data-driven decision-making across production, quality control, and predictive maintenance. Algorithms including convolutional neural networks (CNN), support vector machines (SVM), random forests (RF), and reinforcement learning (RL) are increasingly deployed to optimize complex manufacturing processes, detect anomalies, and predict component failures with high accuracy. Studies report fault detection accuracies of 92–99.4%, while ML-driven process optimization reduces energy consumption by up to 23% and machining errors by 18–35%. This review systematically examines ML applications across tool condition monitoring, surface quality prediction, structural health monitoring, and additive manufacturing process control, highlighting key algorithms, datasets, and performance benchmarks drawn from recent peer-reviewed literature.

Keywords: Machine learning; Smart manufacturing; Tool condition monitoring; Predictive maintenance; Convolutional neural network;

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ICSRR – E047

MECHANICAL AND MICROSTRUCTURAL BEHAVIOUR OF HYBRID ALUMINIUM METAL MATRIX COMPOSITES: A REVIEW

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Abstract

Hybrid aluminum metal matrix composites (HAMMCs) have gained popularity as advanced structural materials that bring together the best of both worlds, i.e. strength hardness, and wear resistance, thanks to the dual-reinforcement strategies. This paper is a summary of experimental research on the mechanical properties of HAMMCs, namely tensile strength hardness impact resistance, fatigue life, etc. Besides, composites reinforced with ceramic particles such as SiC, Al_2O_3, B_4C, and TiB_2 are also included in the review. The effect of different parameters, such as reinforcement weight fraction, particle distribution, and interfacial bonding, is thoroughly examined. Together with SEM/EDS and optical microscopy, microstructural features such as grain refinement, phase evolution, and uniform dispersion of particles are identified as the main factors influencing the mechanical behavior of composites. The review not only points out the challenges faced in producing HAMMCs but also suggests various directions for their optimization, especially for the aerospace, automotive, and structural industries.

Keywords: Aluminium matrix composites, hybrid reinforcement, mechanical properties, microstructural characterization, interfacial bonding.

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ICSRR – E048

SUSTAINABLE WATER RESOURCE MANAGEMENT IN CIVIL ENGINEERING

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Abstract:

Sustainable water resource management is a critical challenge in civil engineering due to rapid urbanization, climate variability, population growth, and industrial expansion. Global freshwater demand has increased by nearly 600% over the last 100 years, while approximately 2.2 billion people lack access to safely managed drinking water. Civil engineering plays a pivotal role in planning, designing, and operating water infrastructure that ensures efficiency, equity, and environmental protection. This chapter presents an integrated framework for sustainable water resource management, emphasizing water conservation, smart infrastructure, reuse technologies, and climate-resilient systems. Quantitative indicators such as water-use efficiency, leakage reduction (20–40%), and energy savings (15–30%) are discussed. Case-based evidence demonstrates how sustainable practices can reduce water stress and enhance resilience. The chapter aligns with global sustainability goals and provides practical insights for engineers, policymakers, and planners.

Keywords: Sustainable water management, civil engineering, water conservation, climate resilience, integrated water systems.

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ICSRR – S049

NANOPHYSICS: PRINCIPLES AND EMERGING TECHNOLOGIES

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Abstract

Nanophysics explores the quantum mechanical, electromagnetic, and thermodynamic behavior of matter at length scales of 1–100 nm, where classical physics frameworks become insufficient and size-dependent phenomena dominate material response. At the nanoscale, quantum confinement, surface plasmon resonance, ballistic electron transport, and enhanced surface-to-volume ratios (>10^6 m^{-1}) fundamentally alter optical, electrical, magnetic, and mechanical properties relative to bulk counterparts. Quantum dots exhibit tunable bandgaps of 1.2–3.5 eV, carbon nanotubes demonstrate electron mobilities exceeding 10^5 $cm^2/V{\cdot}s$, and plasmonic nanostructures concentrate electromagnetic fields with enhancement factors of 10^3–10^8. This review systematically examines the core physical principles governing nanoscale phenomena and surveys emerging technological applications spanning quantum computing, nanoelectronics, nanomedicine, and energy harvesting, drawing on quantitative performance data from peer-reviewed literature to identify both current capabilities and critical research frontiers.

Keywords:Nanophysics, Quantum confinement, Nanomaterials, Nanoscale fabrication, Emerging nanotechnologies.

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ICSRR – E050

POLYMER CHEMISTRY AND ADVANCED COMPOSITE MATERIALS

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Abstract:

Polymer chemistry forms the fundamental scientific backbone of advanced composite material development, enabling the design of high-performance material systems with tailored mechanical, thermal, and functional properties. The integration of thermosetting and thermoplastic polymer matrices with reinforcing phases—including carbon fibers, glass fibers, nanofillers, and natural fiber systems—has produced composites exhibiting tensile strengths exceeding 600 MPa, fracture toughness values up to 8.5 MPa·$m^{0.5}$, and thermal stability beyond 350°C. Recent advances in polymer synthesis, including ring-opening metathesis polymerization (ROMP), atom transfer radical polymerization (ATRP), and bio-based resin development, have expanded composite design space considerably. This review systematically examines the chemistry–structure–property relationships governing advanced composite performance, covering matrix chemistry, fiber–matrix interfacial interactions, nanofiller reinforcement mechanisms, and emerging multifunctional composite systems, with emphasis on quantitative performance data from peer-reviewed literature published between 2015 and 2024.

Keywords: Polymer synthesis, Composite materials, Nanocomposites, Mechanical properties, Advanced manufacturing.

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ICSRR – S051

PREPARATION, BIOLOGICAL AND DOCKING STUDY OF 2, 2'-DIFLUORO DIPHENYLGLYCOLICACID

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Abstract

Aromatic diphenylglycolic acid and various selected derivatives were synthesized with success and systematically examined to determine their structural characteristics, molecular interactions, and biological potential. The synthesis involved a standard benzil–benzilic acid rearrangement strategy, followed by appropriate functional modifications to achieve the target derivative with good yield and purity. The synthesized compounds were recrystallized for purification and verified via extensive spectral characterization. Characteristic absorption bands corresponding to hydroxyl (–OH), carboxylic acid (–COOH), and aromatic functional groups were revealed by Fourier Transform Infrared (FT-IR) spectroscopy. 1H and 13C NMR spectra offered detailed insights into proton and carbon environments, confirming the diphenyl substitution pattern and the presence of a glycolic acid moiety. Molecular interaction studies were performed to understand intramolecular and intermolecular interactions, including hydrogen bonding and π–π stacking, which play a crucial role in the stability and reactivity of these aromatic systems. The biological activity of the synthesized compounds was evaluated through in-vitro antimicrobial assays, demonstrating moderate to significant activity against selected bacterial and fungal strains, with the derivative showing enhanced efficacy due to substituent effects. To rationalize the observed biological behavior, molecular docking studies were carried out against relevant biological target proteins. Docking results indicated favorable binding affinities, stabilizing hydrogen bonds, and hydrophobic interactions within the active site, suggesting a plausible mechanism of action at the molecular level. Overall, the combined experimental and computational studies highlight aromatic diphenylglycolic acid derivatives as promising scaffolds for further development in medicinal chemistry.

Keywords: 2,2'-Diphenylglycolic acid; Synthesis: Spectral characterization; Molecular interactions; Antimicrobial activity; Molecular docking.

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ICSRR – E052

INVESTIGATION OF LEMON SEED OIL BIODIESEL WITH CERIUM OXIDE NANOPARTICLE IN CI ENGINE

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Abstract

Because of increasing automobiles, power plants and factories, increasing of this automobiles, power plants produce the more emissions like CO, HC and NOx. So that the world is searching for the alternative fuel, which will not create any harm to the environment and also it would be less in cost. Biodiesel is one of the main solutions to the global energy crisis. In this present work studied the performances and emission characteristics of Lemon Seed Oil Bio-diesel (GSO). Use of additives for better combustion characteristics to the biodiesel. The blends of Lemon Seed oil (GSO) with the additives Aluminum oxide are B10+20 PPM CeO_2, B20+20PPM CeO_2, B30+20 PPM CeO_2. This blends were analyzed and their performance and emissions characteristics compared with performance and emission characteristics of diesel. Tests were carried out over entire range of engine operation at varying conditions of load. The engine exhaust gas emissions are reduced with increase biodiesel concentration.

Keywords: Lemon Seed oil (LSO); Cerium oxide; Engine Performance characteristics, Exhaust emission characteristics.

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ICSRR – E053

EXPERIMENTAL INVESTIGATION ON THE EFFECT OF CERIUM OXIDE NANOPARTICLE FUEL ADDITIVES ON SAPOTA SEED OIL IN CI ENGINE

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Abstract

Major portion of today's energy demand in the world is being satisfied with fossil fuels. On the record of confronting the up and coming energy crisis, bio oils have come up as a promising source of fuel for IC Engines. As India is an agricultural country, there is a wide extension for the generation of vegetable oils (both edible and non-edible) from various plant assets. This is the reason that colossal research work is going ahead to utilize bio oil as fuel. But there is a serious perception that the performance and efficiency of bio oils is found to be less than that of mineral diesel. This research work is to prove that with necessary modifications in Compression ignition engine the efficiency can be improved and it can be made equivalent or still better than mineral diesel. Sapota Seed Oil is one among them that is available abundantly in India and all over the world. An experimental investigation was made to evaluate the performance and emission characteristics of a diesel engine using different blends of Sapota seed oil with cerium oxide Nano particle additive is added in diesel. Sapota seed Oil was blended with diesel in proportions of 10%, 20%, and 30% by volume, performance and Emission parameters was studied under different loading conditions in compression ignition engine.

Keywords - compression ignition engine, Sapota seed Oil, cerium oxide additives, performance, emission.

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ICSRR – E054

RECENT DEVELOPMENTS OF MECHANICAL AND TRIBOLOGICAL PROPERTIES OF POLYESTER COMPOSITES: A REVIEW

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Abstract:

Polyester matrix composites have attracted a lot of popularity in research due to their ability to be reinforced with various materials, lightweight, and cheap processing. This review paper thoroughly discusses the experimental advancements of the last period that have been made in the mechanical and tribological properties of polyester composites reinforced with natural fibers, synthetic fibers, and hybrid particulate fillers. Properties obtained from tensile flexural hardness, and impact tests are considered along with wear rate, friction coefficient, and sliding behavior under different load and speed conditions. Failure mechanisms have been explained through microstructural correlations using SEM fractography. This review first gathers the numerical results reported in the recent literature, then points out the factors limiting the performance and finally highlights the future research areas to design high-performance, sustainable polyester composite systems.

Keywords: *Polyester matrix composites, mechanical properties, tribological behaviour, natural fibre reinforcement, wear resistance*

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ICSRR – S055

REDOX-RESPONSIVE LIPOSOMAL CO-DELIVERY OF TAXIFOLIN AND GALANTAMINE FOR RESTORATION OF BBB INTEGRITY AND ATTENUATION OF OXIDATIVE NEUROINFLAMMATION IN AB-INDUCED NEURODEGENERATIVE RATS

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Abstract:

Alzheimer's disease (AD) is a multifactorial neurodegenerative disorder characterized by amyloid-β aggregation, oxidative stress, neuroinflammation, cholinergic dysfunction, and blood–brain barrier (BBB) disruption. The present study proposes a redox-responsive liposomal co-delivery system encapsulating Taxifolin and Galantamine for synergistic AD management. Taxifolin provides antioxidant, anti-amyloidogenic, and anti-inflammatory effects, while Galantamine enhances cholinergic neurotransmission through acetylcholinesterase inhibition and nicotinic receptor modulation. The liposomes were characterized for particle size, zeta potential, encapsulation efficiency, and in vitro redox-triggered drug release. Pharmacokinetic evaluation suggests improved bioavailability, prolonged systemic circulation, protection from premature metabolism, and enhanced BBB penetration following intravenous administration. Upon exposure to oxidative conditions, the formulation enables controlled drug release at the pathological site. Pharmacodynamically, the system reduces reactive oxygen species, suppresses pro-inflammatory cytokines, inhibits amyloid aggregation, restores tight junction protein integrity, and improves cholinergic signaling. This dual-targeted nanoformulation represents a promising disease-modifying strategy integrating neuroprotection with symptomatic improvement in Alzheimer's disease.

Keywords: Alzheimer's disease, Amyloid-β aggregation, Redox-responsive liposomes, Toxifolin, Galantamine, Blood brain barrier(BBB).

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ICSRR – S056

IMPACT OF MONOGENIC DISORDERS AND CALCIUM METABOLISM POLYMORPHISMS IN KIDNEY STONE DISEASE

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Abstract:

Kidney stone disease is a common urological disorder that affects nearly 10% of the global population. It is a multifactorial condition influenced by both genetic and metabolic factors. Disturbances in calcium metabolism play a major role in stone formation, and these metabolic processes are tightly regulated by various hormonal mechanisms. Genetic factors, particularly monogenic disorders and genetic polymorphisms, also contribute significantly to the development of kidney stones by altering calcium metabolism. Monogenic stone disorders arise due to inherited mutations in genes responsible for mineral metabolism and renal tubular transport in the kidney. Several inherited conditions, including Dent Disease, Cystinuria, and Primary Hyperoxaluria, are associated with recurrent stone formation. In addition to these rare genetic mutations, genetic polymorphisms also influence susceptibility to kidney stone disease. Genetic polymorphism refers to the occurrence of common DNA sequence variation among individuals within a population. Variations in genes involved in calcium regulation, such as the Calcium-Sensing Receptor and the Vitamin D Receptor, play an important role in maintaining calcium homeostasis. Alterations in these genes may affect intestinal calcium absorption, renal calcium reabsorption, and overall calcium balance, thereby increasing the risk of calcium-based kidney stones. This chapter provides an overview of calcium metabolism, the genetic basis of monogenic stone disorders, and the role of genetic polymorphisms in modulating calcium homeostasis. Understanding the interaction between hormonal regulation, genetic mutations, and polymorphic variations is essential for improving the diagnosis, prevention, and personalized management of hereditary kidney stone diseases.

Keywords: Monogenic Stone Disorder; Genetic Polymorphism; Dent Disease; Cystinuria; Primary Hyperoxaluria;

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ICSRR – S057

ROLE OF BIOMARKERS IN THE EARLY DETECTION OF RENAL INJURY

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Abstract:

Acute kidney injury (AKI) is a major global health problem associated with significant morbidity and mortality. Conventional diagnostic markers such as serum creatinine and urine output often fail to detect kidney injury at early stages. Therefore, the identification of accurate biomarkers for early detection has become an important focus in nephrology research. Among the emerging biomarkers, urinary neutrophil gelatinase-associated lipocalin (uNGAL) and urinary kidney injury molecule-1 (uKIM-1) have shown considerable promise in identifying renal injury at early stages. These biomarkers are rapidly released following renal tubular damage and can be detected in urine within a few hours after injury. Their high sensitivity and specificity allow earlier diagnosis compared with traditional indicators. This chapter discusses the role of novel biomarkers, including NGAL, KIM-1, IL-18, and L-FABP, in the early detection of renal injury and highlights their potential clinical applications in improving diagnosis, monitoring, and management of AKI.

Keywords: Acute kidney injury (AKI); Biomarkers; urinary neutrophil gelatinase-associated lipocalin (uNGAL); urinary kidney injury molecule-1 (uKIM-1).

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ICSRR – S058

PHARMACOLOGICAL PREVENTION OF RECURRENT STONES

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Abstract:

Recurrent nephrolithiasis is a common and challenging condition; with nearly half of affected individuals develop new stones within ten years. Pharmacological prevention, guided by metabolic evaluation and analysis of stone composition, is central to reducing recurrence risk. Thiazide diuretics are widely used in patients with hypercalciuria, as they lower urinary calcium excretion and thereby reduce calcium stone formation. Potassium citrate is effective in correcting hypocitraturia and alkalinizing urine, which prevents calcium oxalate and uric acid stones. Allopurinol, by inhibiting uric acid synthesis, is beneficial in patients with hyperuricosuria or uric acid stones. Other agents, such as magnesium supplements and acetohydroxamic acid, have limited or specialized roles, particularly in struvite stones. Evidence from randomized controlled trials demonstrates that tailored pharmacological therapy, when combined with lifestyle measures such as adequate hydration, sodium restriction, and moderated protein intake, can reduce recurrence rates by 40–60%. Despite proven efficacy, long-term adherence and monitoring for adverse effects are essential to ensure sustained benefit. Thus, individualized pharmacological intervention, integrated with dietary and behavioral strategies, represents the cornerstone of recurrent stone prevention and remains a critical component of comprehensive management in patients at risk of recurrence.

Keywords: Recurrent nephrolithiasis; Kidney stone prevention, Pharmacological therapy; Thiazide diuretics; Hypercalciuria.

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ICSRR – S059

NANOPARTICLE-BASED DRUG DELIVERY STRATEGIES FOR CROSSING THE BLOOD-BRAIN BARRIER IN ALZHEIMER'S DISEASE

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Abstract:

Alzheimer's disease (AD) is a progressive neurodegenerative condition marked by progressive loss of neuronal function, memory impairment, and cognitive decline. Due to the aging population, it is the most prevalent cause of dementia globally and a significant public health concern. Alzheimer's disease is characterized by intracellular neurofibrillary tangles made of hyperphosphorylated tau protein, extracellular amyloid-beta plaque deposition, and persistent neuroinflammation. The brain's gradual neuronal degeneration and disruption of synaptic transmission are caused by these pathological alterations [1][3].The blood–brain barrier (BBB), a highly selective biological barrier that shields the brain from dangerous substances flowing in the bloodstream, is one of the main obstacles to treating Alzheimer's disease. The BBB restricts the delivery of therapeutic medicines to the central nervous system even though it is essential for preserving brain homeostasis. Poor therapy outcomes for neurological illnesses are caused by many conventional medications' inability to effectively pass the blood-brain barrier [3][4].Recent developments in nanotechnology have presented medication delivery methods based on nanoparticles as viable ways to get around these limitations. Drug stability, bioavailability, and targeted delivery to certain brain regions impacted by neurodegeneration can all be improved by nanoparticles. The potential of a variety of nanocarriers, including lipid nanoparticles, polymeric nanoparticles, dendrimers, and inorganic nanoparticles, to carry therapeutic drugs across the blood-brain barrier via processes such receptor-mediated and adsorptive-mediated transcytosis has been studied [2][5][6].The pathophysiology of Alzheimer's disease, difficulties in delivering medications to the brain, and new advancements in therapeutic approaches based on nanoparticles are all covered in this chapter.

Keywords: Alzheimer's disease, Blood–Brain Barrier (BBB), Nanoparticle-based drug delivery, Brain targeting, Neurodegenerative diseases.

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ICSRR – S060

THE INTERNAL WILDLIFE OF HYPERCORTISOLISM: CUSHING`S SYNDROME

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Abstract:

Cushing's syndrome can arise from pituitary ACTH, ectopically produced ACTH, an adrenal tumor, or medication. Cushing's disease, which refers to the condition caused by excess pituitary ACTH leading to adrenal gland enlargement, is a complex and challenging endocrine disorder. It should be considered in patients with unusual symptoms for their age, those displaying multiple and worsening features, and those with adrenal incidentalomas. It's also a common issue in children who fail to grow in height percentiles while gaining weight. Endogenous Cushing's syndrome is more prevalent in women. About 80% of cases result from an ACTH-dependent cause, with 80% of those being due to a pituitary adenoma (Cushing's disease) and the remaining 20% due to ectopic ACTH secretion. The other non-ACTH-dependent causes of Cushing's syndrome stem from benign adrenal adenomas (60%) and carcinomas biochemically (40%). Given the specialized nature of the treatment, all cases need to be referred to a major medical center. The most distinctive clinical signs for diagnosing endogenous Cushing's syndrome include thin skin, easy bruising, and muscle weakness. There should be a strong clinical suspicion before starting investigations. The diagnosis relies on a combination of dexamethasone suppression tests, loss of circadian rhythm, and urine tests for free cortisol. However, differentiating pituitary from non-pituitary sources of excess ACTH should ideally use mical tests. Treatment for endogenous Cushing's syndrome involves using drugs to reduce corticosteroid levels before surgery or in cases where tumors cannot be surgically removed. The preferred surgical approach for Cushing's disease is transsphenoidal surgery; in cases of recurrence or tumors that can't be reset, bilateral laparoscopic adrenalectomy can be considered.

Keywords: Cushing's syndrome, Exogenous Cushing's syndrome, Endogenous Cushing's syndrome, Excess of glucocorticoids, ACTH.

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ICSRR – S061

MEDICAL EXPULSIVE THERAPY IN UROLITHIASIS: EVIDENCE-BASED APPLICATIONS OF ALPHA BLOCKERS AND CALCIUM CHANNEL BLOCKERS IN CALCULI

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Abstract:

Background: Minimally invasive treatments of urolithiasis, including extracorporeal shock wave lithotripsy, ureteroscopy, and percutaneous nephrostolithotomy, have very high efficacy with high cost. The use of medical expulsive therapy (MET) offers a non-surgical and cost-effective alternative to the management of the rightly chosen patient with ureteral calculi.

Objective: The purpose of the review is to summarize the modern literature related to MET, as well as providing clinicians with recommendations on the rational use of MET in the treatment of stone disease.

Methods: A systematic review of clinical trials, meta-analyses, and AUA/EAU guidelines was conducted to evaluate the effectiveness and safety of medical expulsive therapies suggested, including, calcium channel blockers, corticosteroids, and adrenergic α -adrenoceptor antagonists.

Results: AUA/EAU guidelines have confirmed medical expulsive therapy (MET) as a valuable reatment alternative in the management of selected patients. The α-adrenoceptor antagonist and calcium channel blockers have been shown to have a higher success rate in stone-expulsion, with the former proving to be more effective than the latter. Specifically nifedipine and other alpha-antagonists of adrenergic nature have been confirmed as clinically effective, safe and well tolerated. Moreover, it has also been shown that MET also decreases the number of colic bouts, narcotic use, and hospitalization, thus decreasing the number of healthcare expenses and eliminating unnecessary surgical operations.

Keywords: Kidney; stones; urolithiasis, alpha blockers , calcium channel blockers.

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ICSRR – S062

INFLUENZA VIRUS: EVOLUTION, PANDEMICS, AND MODERN THERAPEUTIC STRATEGIES

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Abstract:

Influenza is a highly contagious viral respiratory disease caused mainly by influenza A and B viruses, which undergo frequent antigenic changes leading to seasonal epidemics and occasional pandemics. It spreads through respiratory droplets and presents with symptoms such as fever, cough, myalgia and respiratory complications, particularly in high-risk groups like children and the elderly. Vaccination remains the most effective prevention measure, while antiviral drugs such as Neuraminidase inhibitors are used for treatment and prophylaxis. However, high mutation rates and antiviral resistance continue to challenge control efforts. Recent advances in Neuraminidase-based vaccine strategies offer promising prospects for broader and longer-lasting protection against diverse influenza strains.

Keywords: Influenza, Hemagglutinin, Neuraminidase, Oseltamivir, Zanamivir.

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ICSRR – S063

THE HUMAN LIVER: BRIDGING BIOLOGICAL FUNCTION WITH PATHOPHARMACEUTICAL INSIGHTS

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Abstract:

The liver is the largest internal organ in the human body and is considered to be one of the most vital glands in human biology. The liver is involved in metabolism, detoxification, digestion and nutrient storage. This chapter will discuss the basic structure and function of the human liver, which includes its gross anatomy, microscopic anatomy, blood supply, nerve supply, and other vital physiological functions of the human liver. Moreover, some of the common diseases of the liver, which include metabolic dysfunction-associated steatotic liver disease, viral hepatitis, alcohol-associated liver disease, cirrhosis, and hepatocellular carcinoma, are also described in this chapter. The chapter will provide a brief description of the liver and its importance in human biology in a simple way.

Keywords: Anatomy of liver; Hepatocytes; Metabolism; Bile secretion; Detoxification; Liver disease.

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ICSRR – S064

FRAGILE X SYNDROME: A COMPREHENSIVE REVIEW OF ETIOLOGY, PATHOPHYSIOLOGY, AND MANAGEMENT

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Abstract:

Fragile X syndrome (FXS) is the most common inherited single-gene cause of intellectual disability and a significant genetic cause of autism spectrum disorder. The disorder shows variable expressivity and reduced penetrance, especially in females due to X-chromosome inactivation. Clinically, FXS is associated with intellectual disability, behavioral problems, anxiety, and autism-related features. Diagnosis is mainly performed using molecular genetic tests such as PCR and Southern blot analysis to detect CGG repeat expansion and methylation status.

Keywords: FMR1; Gene therapy, treatment, fragile X messenger ribonucleo protein (FMRP);

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ICSRR – S065

NANO ROBOTS FOR TARGETED DRUG DELIVERY

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Abstract:

Nanotechnology has emerged as a revolutionary field in modern medicine, particularly in drug delivery systems. Nanorobots are nanoscale devices designed to perform specific tasks within the human body, including targeted drug delivery to diseased tissues. These microscopic machines can navigate through the bloodstream, recognize specific biological signals, and release therapeutic agents directly at the disease site. Targeted drug delivery using nanorobots improves treatment efficiency while minimizing systemic side effects. The integration of nanotechnology, biotechnology, and artificial intelligence has significantly advanced the development of nanorobotic systems. Nanorobots have shown promising applications in cancer therapy, cardiovascular diseases, and neurological disorders. This chapter discusses the concept, epidemiology, pathophysiology, clinical relevance, and emerging research related to nanorobots for targeted drug delivery.

Keywords: Nanorobots, Targeted drug delivery, Nanotechnology, Nanomedicine, Drug delivery systems, Cancer therapy.

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ICSRR – S066

GENETIC PREDISPOSITION IN KIDNEY STONE DISEASE

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Abstract:

Kidney stone disease (nephrolithiasis) affects approximately 10–15% of the global population and is now recognized as a chronic systemic condition with metabolic and cardiovascular implications. Its pathogenesis is multifactorial, involving genetic, metabolic, and environmental factors that drive urinary supersaturation and crystal formation. Heritability estimates of 45–55% underscore the substantial genetic contribution to individual susceptibility. The genetic architecture spans rare monogenic disorders — including primary hyperoxaluria, cystinuria, Dent disease, and Bartter syndrome — and common polygenic susceptibility identified through GWAS, implicating key loci such as CLDN14, SLC34A1, CASR, VDR, and CYP24A1. These variants disrupt fundamental mechanisms including hypercalciuria, hyperoxaluria, hyperuricosuria, reduced urinary citrate, and renal tubular dysfunction. Advances in next-generation sequencing have improved diagnostic precision and enabled genotype-guided management, while pharmacogenomics, RNA interference therapies, and microbiome–genetics interactions offer emerging avenues for precision medicine. This chapter reviews the genetic basis of kidney stone disease — encompassing monogenic causes, polygenic risk, implicated pathways, and clinical implications — to inform personalized prevention and treatment strategies.

Keywords: Nephrolithiasis, genetic predisposition, monogenic disorders, GWAS, hypercalciuria, polygenic risk, precision medicine.

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ICSRR – E067

ISOLATION OF ENDOPHYTIC FUNGI AND DEVELOPMENT OF ENDOPHYTE-DERIVED BIO-PRESERVATIVE – A REVIEW

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Abstract:

Around 31% of food supplies are wasted due to food rotting, which is a major issue that affects both the environment and the global economy. Multitudinous studies have shown that some food preservatives are dangerous to mortal health and may ultimately beget cancer. Experimenters are getting more interested in factory excerpts due to their strong antioxidant and antibacterial rates. Microbial food deterioration, which leads to food waste, is generally responsible for the mischievous goods of food product and processing on environmental sustainability. In general, waste happens after primary production and harvesting, such as in households and food service businesses. In general, 15–20% of food is thought to be wasted. Although the causes of food spoiling vary, a number of microorganisms are crucial to the deterioration of various food types. Bioactive substances released by fungus as a derivate of their metabolism are known as fungal secondary metabolites. These metabolites can belong to a number of different chemical classes, similar as organic acids, terpenoids, alkaloids, and polyketides. These metabolites have a variety of uses in many industries and have demonstrated encouraging biological activity. Among these uses is the preservation of food using these metabolites. However, because these metabolites have demonstrated interesting physiochemical properties and functional features, the primary focus of the current work is the applications of these metabolites in food preservation. The eventuality of these metabolites in food preservation has been demonstrated by the food packaging, coating, and turmoil diligence.

Keywords: Food Spoilage; Endophytic Fungi; Fungal Secondary Metabolites; Bio-preservatives; Antimicrobial Activity; Food Preservation.

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ICSRR – S068

PHYTOCHEMICAL COMPOSITION AND THERAPEUTIC POTENTIAL OF COMMELINA BENGHALENSIS LINN

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Abstract

Medicinal plants are valuable sources of bioactive compounds that contribute to the discovery of novel therapeutic agents. *Commelina benghalensis* Linn., commonly known as Benghal dayflower, is a perennial herb widely distributed in tropical and subtropical regions. Traditionally, the plant has been used in various indigenous medicinal systems to treat several ailments such as inflammation, infections, wounds, and metabolic disorders. Phytochemical investigations have revealed that the plant contains several secondary metabolites including flavonoids, tannins, glycosides, saponins, sterols, and terpenoids. These phytochemicals are responsible for the diverse pharmacological activities exhibited by the plant. Recent studies have demonstrated antimicrobial, antioxidant, antidiabetic, anti-inflammatory, anticancer, and hepatoprotective properties of the plant extracts. In addition, certain bioactive compounds such as stigmasterol, campesterol, n-octacosanol, and phenolic constituents have been isolated and characterized from different parts of the plant. The presence of these compounds suggests the potential use of *C. benghalensis* as a natural source for drug development. This chapter reviews the phytochemical composition, traditional uses, pharmacological activities, and therapeutic potential of *Commelina benghalensis*. Furthermore, it highlights the importance of further research in isolating novel bioactive molecules and understanding their mechanisms of action for pharmaceutical applications.

Keywords: Commelina benghalensis, phytochemicals, medicinal plants, antimicrobial, antioxidant, pharmacological activities.

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ICSRR – S069

MARINE MICROORGANISMS IN ENVIRONMENTAL BIOREMEDIATION: MECHANISMS, APPLICATIONS AND FUTURE PERSPECTIVES

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Abstract:

Marine ecosystems represent one of the largest reservoirs of microbial diversity on Earth, harboring a wide range of microorganisms that play essential roles in nutrient cycling and environmental sustainability. Among these, marine microorganisms have gained increasing attention for their potential applications in environmental bioremediation. The increasing discharge of pollutants such as hydrocarbons, heavy metals, pesticides, plastics, and industrial chemicals into marine environments has created significant ecological challenges. Marine microorganisms possess unique metabolic capabilities that allow them to degrade, transform, or detoxify these harmful pollutants into less toxic forms. Due to the extreme and dynamic conditions of marine habitats, these microbes have evolved specialized enzymatic systems and metabolic pathways that enable them to survive under high salinity, pressure, and variable temperatures while maintaining their biodegradation efficiency. Various groups of marine microorganisms, including bacteria, fungi, archaea, and microalgae, contribute significantly to the natural remediation processes occurring in marine ecosystems. These organisms can metabolize complex organic compounds, absorb heavy metals, and break down synthetic materials such as plastics. The present chapter discusses the diversity of marine microorganisms involved in environmental bioremediation, the mechanisms through which they degrade pollutants, and the various environmental applications of these microbes. Additionally, the chapter highlights recent advancements in marine microbial biotechnology and emphasizes the future prospects for developing sustainable and efficient bioremediation strategies based on marine microbial resources.

Keywords: Marine microorganisms, Environmental bioremediation, Marine pollution, Biodegradation, Marine biotechnology, Pollutant degradation.

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ICSRR – S070

PHYTOCHEMICAL CONSTITUENTS AND PHARMACOLOGICAL ACTIVITIES OF BIOACTIVE COMPOUNDS FROM DIFFERENT PARTS OF EUPHORBIA HIRTA LINN

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Abstract

Medicinal plants have played a crucial role in traditional healthcare systems across the world. Among them, *Euphorbia hirta* Linn., a member of the family Euphorbiaceae, has gained significant attention due to its wide range of therapeutic applications. The plant is widely distributed in tropical and subtropical regions and is traditionally used to treat various ailments including asthma, gastrointestinal disorders, skin infections, and inflammatory diseases. Phytochemical investigations have revealed that different parts of *Euphorbia hirta*, such as leaves, stems, roots, flowers, and latex, contain numerous bioactive compounds including flavonoids, alkaloids, tannins, phenolic acids, terpenoids, and glycosides. These phytoconstituents are responsible for various pharmacological activities such as antimicrobial, antioxidant, anti-inflammatory, antidiabetic, antimalarial, and anticancer effects. The present chapter provides a comprehensive overview of the phytochemical composition and pharmacological properties of different parts of *Euphorbia hirta*, highlighting its potential as a valuable medicinal plant for the development of novel therapeutic agents.

Keywords: Euphorbia hirta Linn.; Secondary metabolites; Bioactive compounds; Pharmacological activities; Antioxidant activity;

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ICSRR – S071

NATURAL ANTIBACTERIAL AND ANTIBIOFILM AGENTS FROM HELIOTROPIUM INDICUM: A STRATEGY AGAINST MULTIDRUG-RESISTANT BACTERIA

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Abstract:

The emergence of multidrug-resistant (MDR) bacteria has become a major global health challenge due to the increasing failure of conventional antibiotics. Medicinal plants are gaining significant attention as alternative sources of novel antimicrobial agents. *Heliotropium indicum* L., a medicinal plant belonging to the family Boraginaceae, has been traditionally used in folk medicine for the treatment of infections, wounds, and inflammatory diseases. Phytochemical studies have revealed that the plant contains several bioactive compounds including alkaloids, flavonoids, phenolic compounds, tannins, saponins, and terpenoids. These secondary metabolites contribute to the plant's antimicrobial and therapeutic properties. Several experimental studies have demonstrated that extracts of *Heliotropium indicum* exhibit significant antibacterial activity against both Gram-positive and Gram-negative bacteria such as *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Klebsiella* species. In addition to antibacterial effects, the plant has shown potential antibiofilm activity by inhibiting bacterial adhesion, disrupting established biofilms, and interfering with quorum sensing mechanisms. These activities are particularly important in combating multidrug-resistant pathogens that rely on biofilm formation for survival and persistence. The present chapter provides an overview of the phytochemical constituents, antibacterial mechanisms, and antibiofilm potential of *Heliotropium indicum*, highlighting its potential as a promising source of novel antimicrobial agents against multidrug-resistant bacteria.

Keywords: Heliotropium indicum, antibacterial activity, antibiofilm activity, multidrug-resistant bacteria, phytochemicals, medicinal plants.

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ICSRR – E072

INTEGRATING PLANT EXTRACTS AS BIO-BASED PRESERVATIVES IN ECO-FRIENDLY FOOD PACKAGING

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Abstract:

Plant-derived components have gained significant attention in sustainable food packaging due to their antimicrobial and antioxidant properties, which contribute to improved food safety and extended shelf life. Increasing concerns regarding food spoilage, environmental sustainability, and the negative impacts of petroleum-based plastics have driven the development of biodegradable and bioactive packaging alternatives. When incorporated into biodegradable polymer matrices such as chitosan, starch, cellulose, gelatin, pectin, and polylactic acid, plant extracts act as natural preservatives, enabling the formulation of active packaging systems that enhance food quality while reducing environmental impact. Particular emphasis is placed on antioxidant and antimicrobial mechanisms through which plant extracts contribute to food preservation and shelf-life extension. The advantages of plant-based active packaging are further discussed, including improved biodegradability, reduced waste generation, enhanced resource efficiency, and lower ecological footprint. Overall, the integration of plant extracts into biodegradable packaging materials represents a promising approach for improving food quality, safety, and shelf life while supporting sustainability objectives. Continued research and technological advancement are essential to overcome existing barriers and facilitate the transition of plant-based active food packaging from laboratory-scale research to commercial applications.

Keywords: Plant-based packaging, Biodegradable materials, Sustainable food packaging, Natural preservatives, Bioactive compounds.

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ICSRR – E073

AGRO-INDUSTRIAL WASTE PIGMENT INCORPORATED BIODEGRADABLE COLORIMETRIC SENSOR LABEL FOR SMART PACKAGING AND SPOILAGE INDICATION OF PROTEIN FOODS

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Abstract:

Food safety and quality assessment are some of the global issues affecting many people around the world today. As a result, new technologies are being developed by the food industry to help alleviate this problem. For example, existing types of food packaging have primarily been limited to providing barriers that protect food from contamination, moisture, and air; however, they do not indicate whether the food contained in the package is of high quality. Therefore, smart, and biodegradable colourimetric sensor labels have been designed to provide relevant and timely data on the quality of food products during their lifespan, thus solving many issues tied to food quality [1]. Colourimetric sensor labels made from agro-industrial waste (fruit skins, vegetable scraps, and plant parts) can be used to monitor food quality through visual colour change as the food product spoils. Plants have naturally occurred pigments such as anthocyanins, betalains, carotenoids, and chlorophyll that will change colour due to changes in pH when the product has degraded. As a result of generating volatile nitrogenous compounds and raising pH, protein food items like meat, fish, poultry, and dairy are more at risk of spoilage during storage. Biopolymers are usually better than synthetic polymers at forming films (ex, Chitosan, starch, pectin, alginate, cellulose). Therefore, biopolymers are the ideal material for making biodegradable sensor films. These smart materials can detect volatile compounds released from decomposed proteins. These smart materials can identify the volatile compounds produced by decomposing proteins. This will eventually offer an easy way to monitor how fresh protein products are. Therefore, using pigments made from the waste materials from crops to make biodegradable sensor labels is a smart way to create intelligent food packaging alternatives, contributing to better food safety, longer shelf life for food products, and less waste from spoiled product items.

Keywords: Smart food packaging, Colorimetric sensor labels, Natural pigments, Agro-industrial waste, Biodegradable polymer films.

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ICSRR – E074

EXPLORING MARINE SPONGE METABOLITES AS NEXT-GENERATION ANTICOAGULANT AGENTS

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Abstract:

Thrombotic and cardiovascular diseases constitute major global health problems because they rank among the top reasons people get sick and die throughout the world. Anticoagulant therapy functions as an essential treatment method which helps patients avoid thromboembolic events while also treating these medical conditions. The current anticoagulants which include heparin and warfarin and direct oral anticoagulants (DOACs) present numerous challenges because they create bleeding dangers and drug interaction problems and they have narrow treatment ranges and their extended use creates safety issues. The existing problems with anticoagulant agents demonstrate an urgent requirement for new anticoagulant drugs which offer better safety features and more reliable performance. The vast biological diversity and distinct chemical properties of marine ecosystems create an exceptional opportunity to discover new therapeutic drugs which remain mostly unexplored. Sponges from the Porifera phylum function as the main sources which produce bioactive secondary metabolites in marine environments. The simple body structure of sponges together with their microbial symbiotic relationships enables them to create a wide range of chemical substances that contain valuable medicinal properties. Marine sponge metabolites exist in several different classes which include sulfated polysaccharides and alkaloids and terpenoids and steroids and peptides and glycosaminoglycan-like molecules because most of these substances demonstrate powerful anticoagulant properties. The compounds produce their effects through several pathways which include thrombin and factor Xa coagulation factor inhibition and antithrombin III activation and platelet aggregation suppression and fibrin formation disruption. The studies which used in vitro coagulation assays and in vivo thrombosis models produced results that showed anticoagulant effectiveness with potentially reduced side effects when compared to traditional medications. The advantages which exist with these benefits face multiple obstacles which need to be addressed before proceeding.

Keywords: Marine sponges, Anticoagulant therapy, Bioactive metabolites, Thrombotic disorders, Sulfated polysaccharides.

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ICSRR – E075

ENZYME-ASSISTED DEGRADATION OF DOMESTIC WASTE USING BACILLUS SUBTILIS AND DEVELOPMENT OF A PROTOTYPE WASTE NEUTRALIZATION SYSTEM

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Abstract

The increase in the amount of household rubbish being produced in households has caused many environmental problems such as poor disposal techniques and improper treatment of waste. In this paper, we've looked at how effective certain microbial enzymes are in breaking down components of household rubbish. The enzyme-producing bacterium *Bacillus subtilis* was cultured in nutrient broth and a crude extract of the extracellular hydrolytic enzyme mixtures was prepared by centrifugation to obtain a crude extract. Major enzymes that are involved in the degradation of household waste, namely amylase, protease, cellulase, lipase, pectinase, and urease, were evaluated quantitatively and qualitatively using the DNS assay, tyrosine assay, and titration method, respectively to measure the enzymatic activities. Results indicate that several extracellular enzymes capable of degrading carbohydrates, proteins, lipids, and plant-based products are present in domestic agriculture waste. A low-cost under prototype has been created from a Biological Decomposition and Conversion Chamber (BDCC) and a High-Temperature Waste Neutralization Chamber (HTWNC) to demonstrate the concept of integrated domestic waste management. This concept supports the use of microbial enzyme systems as one aspect of sustainable household waste treatment.

Keywords: Microbial enzymes, Bacterium, Degradation, Quantitative analysis, Prototype, Sustainable, Waste management.

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ICSRR – S076

STRUCTURAL, MORPHOLOGICAL AND SURFACE INVESTIGATION OF PEROVSIKTE (LSNO) NANOPARTICLES

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Abstract:

Perovsikte-type transition metal oxides have emerged as promising electrode materials for next-generation energy storage systems due to their remarkable electronic conductivity, structural stability, and tunable redox properties. In the present study, lanthanum strontium nickel oxide ($LaSrNiO_3$, LSNO) nanoparticles were synthesized and systematically characterized to investigate their structural, morphological, and surface properties relevant to electrochemical applications. The crystalline phase and structural purity of the synthesized LSNO nanoparticles were confirmed using X-ray diffraction (XRD), revealing a well-defined perovskite crystal structure with sharp diffraction peaks. Fourier transform infrared spectroscopy (FTIR) analysis verified the formation of metal–oxygen bonds and confirmed the presence of characteristic vibrational modes associated with the perovskite lattice. The surface area and pore distribution were examined through Brunauer–Emmett–Teller (BET) analysis, indicating a mesoporous structure that is favorable for electrolyte ion diffusion and enhanced electrochemical activity. Morphological examination using scanning electron microscopy (SEM) revealed agglomerated nanoscale particles with irregular yet porous surface textures, which provide abundant active sites for charge storage processes. Elemental composition and chemical purity were validated by energy-dispersive X-ray spectroscopy (EDAX), confirming the presence of La, Sr, Ni, and O elements without significant impurities. The combined structural and surface analyses suggest that LSNO nanoparticles possess desirable physicochemical properties suitable for high-performance electrochemical energy storage devices such as super capacitors. These findings provide valuable insights into the design and optimization of Perovsikte-based electrode materials for advanced energy storage technologies.

Keywords: Perovsikte oxide, Nano material, Transition metal Oxide, LSNO nanoparticles, BET surface area, Energy storage devices.

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ICSRR – S077

SYNTHESIS, GROWTH, STRUCTURAL, OPTICAL ASSESSMENTS AND SECOND ORDER NLO STUDIES OF D-PHENYLGLYCINIUM DERIVATIVES FOR OPTOELECTRONIC APPLICATIONS

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Abstract

The domain of nonlinear optics is witnessing considerable expansion, incorporating knowledge from multiple scientific areas, such as physics, chemistry, optics, crystal growth, optoelectronics, and engineering. The study of nonlinear optics garners significant attention in organic-inorganic blend compounds, owing to their diverse properties that find applications in various fields. In-depth investigations have concentrated on the non-linear optical characteristics of organic and semi-organic crystals, which hold promising applications in device fabrication. A single crystal of D-phenylglycine derivatives, including Bis(D-phenylglycinium) sulfate monohydrate (BDPGS) and D-phenylglycine hydrochloride (DPGCL), were synthesized and grown through the slow evaporation method utilizing water as a solvent. The single crystal XRD analysis demonstrated that BDPGS crystallizes in the monoclinic space group $P2_1$, while DPGCL crystallizes in the orthorhombic space group $P2_12_12$. The optical properties of the compounds were characterized through UV-Visible absorption and reflectance spectra, revealing cut-off wavelengths of 230 nm and 228 nm for BDPGS and DPGCL, respectively. This indicates a bandgap of 5.4 eV, suggesting superior optical quality for potential applications. The notably low Urbach energy indicates that the crystal is nearly devoid of defects, thereby maintaining its structural integrity and evaluation of refractive index demonstrated the compounds' promising optical behavior. The effectiveness of the second harmonic generation for the synthesized crystals was clearly demonstrated using the Kurtz Perry powder method, validating both the crystals shows tremendous potential for advanced technological applications.

Keywords: Slow evaporation method, X-ray diffraction, Structural, Optical bandgap, Nonlinear analysis.

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ICSRR – E078

PERFORMANCE AND COST ANALYSIS OF TWO COMPONENT TBM PRIMARY GROUT

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Abstract

This study presents an integrated approach combining Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) for the sustainable construction of diaphragm walls (D-walls). Diaphragm walls are widely used in deep excavation and underground construction, but their construction involves high material consumption and energy usage. The research focuses on optimizing material selection, construction methodology, and cost parameters while minimizing environmental impact. The role of supplementary cementitious materials (SCMs), rheological properties, and pumpability of slurry and concrete are also analyzed. Laboratory testing and cost evaluation are carried out to validate the proposed approach. The study aims to provide a sustainable, cost-effective, and technically efficient framework for diaphragm wall construction.

Keywords: LCC; LCA; D-Walls; Life Cycle Costing; Life Cycle Assesment

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ICSRR – E079

SUSTAINABLE WASTE MANAGEMENT: DEVELOPING LOW-COST PAVER BLOCKS USING POZZOLANIC PROPERTIES

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Abstract:

This study examines the environmental concerns linked to conventional concrete production by exploring the feasibility of utilizing Saw Dust Ash (SDA) as a partial replacement for cement in the manufacture of concrete paver blocks. Although concrete continues to be the most widely used construction material worldwide, its cement component is a major contributor to carbon dioxide (CO2) emissions and the depletion of natural resources. Saw dust ash, produced through the controlled combustion of sawmill waste, possesses silica-rich pozzolanic characteristics that make it a potential supplementary cementitious material. The incorporation of this agro-industrial byproduct into concrete not only supports sustainable construction practices but also helps address waste disposal problems associated with sawmill residues. Furthermore, the use of SDA has the potential to reduce the environmental footprint of construction materials while maintaining the required strength and durability of concrete paver blocks.

Keywords: Sawdust Ash; Sustainable Construction; Concrete Paver Blocks; Cement Replacement; Waste Management;

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ICSRR – E080

DEVELOPMENT OF AN HSFG BOLT QUANTITY & CAPACITY CALCULATOR FOR I-BEAM SPLICE JOINT FOR E250 & E350 COMPARISON

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Abstract:

Steel structures frequently utilize bolted splice connections to join structural members where transportation limitations or erection procedures require segmented construction. High Strength Friction Grip (HSFG) bolts are widely used in such connections due to their ability to transfer loads through friction between plates, providing improved structural reliability and slip resistance. Designing HSFG bolted splice joints requires numerous calculations involving bolt shear strength, slip resistance, and determination of the required number of bolts. Manual design calculations are time-consuming and prone to error. This study presents the development of an calculator that automates the computation of HSFG bolt capacity and required bolt quantity for I-beam splice joints. The developed calculator incorporates the design provisions of IS 800:2007 and allows comparison of structural steel grades E250 and E350. The tool enables engineers to quickly evaluate bolt capacity, slip resistance, and required bolt quantity for different design parameters. The results show that the developed tool significantly reduces calculation time while maintaining accuracy and transparency in the design process.

Keywords: HSFG bolts; I-beam splice joint; bolt capacity; Excel calculator; E250 steel; E350 steel.

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ICSRR – E081

SUSTAINABLE AND ECONOMICAL CONSTRUCTION USING FLY ASH INTERLOCKING BRICKS THROUGH FINITE ELEMENT SIMULATION

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Abstract:

The construction industry contributes to economic development but also causes environmental impacts due to high energy consumption and resource depletion. Traditional clay brick production requires the removal of fertile soil and energy-intensive kiln firing, leading to ecological degradation and carbon emissions. Therefore, sustainable alternatives are needed for modern construction. This chapter examines fly ash interlocking bricks as a sustainable masonry material. Fly ash, a by-product of coal-fired thermal power plants, has pozzolanic properties suitable for brick manufacturing. Its use helps reduce industrial waste and conserve natural resources. Structural performance is evaluated using Finite Element Analysis (FEA) in ANSYS Workbench. The analysis focuses on compressive strength, deformation behavior, and stress distribution. Results indicate compressive strengths of about 8–10 MPa, demonstrating that fly ash interlocking bricks can serve as an effective and sustainable construction material.

Keywords: Fly ash bricks; Interlocking masonry; Sustainable construction; Finite element analysis; ANSYS simulation; Eco-friendly materials.

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ICSRR – E082

STRATEGIC INTERFACE RESPONSIBILITY PLANNING FOR SEAMLESS EXECUTION OF UNDERGROUND METRO PROJECTS

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Abstract:

Underground metro rail projects involve complex construction environments where multiple contractors, engineering disciplines, and system packages operate simultaneously. Effective interface management is therefore essential to ensure seamless coordination among civil, architectural, mechanical, electrical, and system works. This study presents a strategic framework for Interface Responsibility Planning (IRP) to improve coordination and reduce construction conflicts in underground metro infrastructure projects. The research analyses the interface management practices implemented in the Chennai Metro Rail Phase-II project, focusing on tools such as the Interface Management Plan (IMP), Interface Coordination Sheets (ICS), Master Interface Matrix (MIM), and BIM-based coordination models. These tools help define responsibilities, track dependencies, and monitor interface risks throughout the project lifecycle. The proposed approach integrates BIM-based coordination with interface responsibility allocation to improve communication among stakeholders and minimize clashes during construction. The results indicate that systematic interface responsibility planning significantly enhances construction efficiency, reduces rework, and ensures timely project execution. The framework can serve as a practical guideline for managing complex interfaces in large-scale underground metro infrastructure projects.

Keywords:Interface Management; Underground Metro Projects; BIM Coordination; Interface Responsibility Planning; Construction Coordination; Infrastructure Management.

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ICSRR – E083

PERFORMANCE AND COST ANALYSIS OF TWO COMPONENT TBM PRIMARY GROUT

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Abstract:

Two-component (A/B) grout systems are widely used in Tunnel Boring Machine (TBM) tunnelling for annular gap backfilling. These systems consist of a cementitious slurry (Component A) and an accelerator (Component B, typically sodium silicate), which rapidly react to form a gel, enabling quick setting and early strength development. The performance and cost-effectiveness of such grouts depend on mix composition, including cement, water, bentonite, supplementary cementitious materials like fly ash, and accelerator dosage.

This study evaluates the relationship between grout performance parameters—such as viscosity, gel time, bleeding, and compressive strength—and overall project cost. The use of industrial by-products reduces cost and environmental impact but may affect early strength and setting characteristics. Therefore, optimization of mix design is essential to achieve a balance between performance, cost, and sustainability. The study highlights the importance of laboratory validation and techno-economic analysis for selecting suitable grout compositions for TBM operations.

Keywords: TBM; Two-component grout; Sodium silicate; Fly ash; Cost analysis; Tunnel grouting.

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ICSRR – E084

INTERFACE COORDINATION FRAMEWORK FOR OCC BUILDINGS IN METRO RAIL

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Abstract:

Metro rail projects involve complex coordination between civil, electrical, signaling, and telecommunications systems. The Operations Control Center (OCC) building acts as the operational hub of the metro network and therefore contains a large number of engineering interfaces. Lack of clearly defined responsibilities and improper construction sequencing often leads to coordination failures, schedule delays, and cost overruns. This Chapter presents a structured methodology for developing an Interface Responsibility Matrix (IRM) and evaluating the impact of construction sequence on OCC building coordination in metro rail projects. The proposed approach identifies interface owners, defines responsibility boundaries, and integrates sequencing analysis with interface management. A sample IRM structure and sequencing framework are presented to demonstrate how coordination can be improved during construction and system integration phases.

Keywords: Metro Rail; Sustainable Construction; IRM; Interface Responsibility Matrix;

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ICSRR – E085

OPTIMIZED DESIGN OF LPB ISOLATORS FOR A SCHOOL BUILDING USING PERFORMANCE TARGETS

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Abstract:

Earthquakes pose significant risks to educational buildings, especially in seismic regions where ground shaking can cause severe structural and non-structural damage. School buildings must maintain a higher level of safety because they accommodate a large number of students and staff during working hours. Traditional seismic design methods focus on increasing the strength and stiffness of the structural system to resist earthquake forces. However, this approach often results in large structural forces, potential damage to structural members, and failure of non-structural components such as ceilings, partitions, and laboratory equipment. Base isolation has emerged as an effective seismic protection strategy for reducing the forces transmitted from the ground to the structure. Lead Plug Bearings (LPB) are widely used base isolation devices that provide flexibility through rubber layers and energy dissipation through a central lead core. When an earthquake occurs, LPB isolators allow controlled movement at the base of the structure, thereby reducing the acceleration and deformation demands on the superstructure. This project investigates the optimized design of LPB isolators for a reinforced concrete school building using performance-based targets. The study defines structural performance objectives such as limiting inter-storey drift, reducing floor accelerations to ensure student safety, and minimizing base shear. A parametric study is conducted by varying isolator stiffness, yield strength, and damping characteristics to identify the most effective configuration. Structural analysis results demonstrate that optimized LPB isolators significantly improve seismic performance while maintaining constructability and cost efficiency.

Keywords: LPB isolators, earthquake, Lead Plug Bearings, isolator stiffness, yield strength.

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ICSRR – E086

NON - LINEAR DYNAMICS RESPONSE OF BASE ISOLATED RC BUILDING IN HIGH - SEISMIC ZONE OF INDIA

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Abstract:

Earthquakes pose a significant threat to reinforced concrete (RC) buildings for G+20 with Terrace Floor, particularly in regions classified as high seismic zones. Conventional fixed-base structures directly transmit seismic forces from the ground to the superstructure, often resulting in severe structural damage. Base isolation is a modern seismic protection technique that decouples the building from ground motion and significantly reduces seismic response. This study investigates the nonlinear dynamic response of a base isolated reinforced concrete building located in a high seismic zone of India. A comparative analysis is conducted between a conventional fixed-base RC building and a base isolated RC building in G+20 with Terrace Floor . The structural models are developed using advanced structural analysis software and subjected to nonlinear time history analysis. Key response parameters such as base shear, displacement, inter-storey drift, and acceleration are evaluated. The results demonstrate that base isolation significantly reduces seismic forces transmitted to the superstructure while increasing overall flexibility. The study confirms that base isolation systems are effective in enhancing structural performance and safety in high seismic zones of India.

Keywords: Nonlinear Dynamic Analysis, Base Isolation System, Reinforced Concrete Building, Seismic Response, High Seismic Zone, Time History Analysis, Inter-storey Drift.

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ICSRR – E087

A REVIEW OF FLOATING STRUCTURES AS A SUSTAINABLE ALTERNATIVE TO LAND RECLAMATION

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Abstract:

Urbanization and population growth have created an increasing demand for land, especially in coastal cities. Traditional land reclamation techniques involve filling water bodies with soil, sand, or rock to create usable land. However, these methods significantly impact marine ecosystems, alter natural hydrodynamics, and contribute to environmental degradation.

Floating structures have emerged as an innovative and sustainable alternative. These structures are built on water and are designed to adapt to fluctuating water levels, making them particularly suitable for coastal and flood-prone regions. This study presents a comprehensive review of floating structures, their classification, design principles, environmental benefits, and comparison with land reclamation. The report critically evaluates global case studies and highlights research gaps, especially in the Indian context. The findings indicate that floating infrastructure can play a key role in future sustainable urban development.

Keywords: Offshore Structure, Floating Structures, Pontoon Structures, Land Reclamation & Floating Structures;

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ICSRR – E088

MACHINE LEARNING APPROACHES FOR PREDICTIVE ANALYTICS IN ENGINEERING APPLICATIONS

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Abstract:

Predictive analytics has become a cornerstone of modern engineering systems, enabling data-driven decision-making, improved reliability, and optimized performance. Machine learning (ML) techniques offer powerful tools to model complex, nonlinear, and high-dimensional engineering data that traditional analytical methods often fail to capture. This chapter presents a comprehensive overview of machine learning approaches for predictive analytics across diverse engineering applications such as manufacturing, mechanical systems, civil infrastructure, energy systems, and transportation. Quantitative performance indicators, including prediction accuracy (85–98%), mean absolute error (MAE reduced by 30–55%), and system downtime reduction (up to 40%), are discussed to demonstrate the effectiveness of ML-based models. The chapter outlines data acquisition, preprocessing, model development, validation strategies, and deployment considerations. Challenges such as data scarcity, model interpretability, and computational complexity are also addressed. The presented methodologies align closely with sustainable development goals by promoting resource efficiency, resilient infrastructure, and intelligent industrial systems.

Keywords: Machine Learning, Predictive Analytics, Engineering Systems, Data-Driven Modeling, Artificial Intelligence.

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ICSRR – M089

A STUDY ON THE INFLUENCE OF SOCIAL MEDIA ON TEENAGERS' SHOPPING PREFERENCES WITH SPECIAL REFERENCE TO CHENNAI CITY

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Abstract:

The rapid growth of social media has significantly transformed the lifestyle and behaviour of teenagers, particularly in the area of shopping. This study aims to examine the influence of social media on teenagers' shopping preferences with special reference to Chennai City. The research focuses on understanding how exposure to digital platforms affects brand awareness, product interest, and purchasing decisions among teenagers. The study is based on primary data collected from teenage respondents in Chennai through a structured questionnaire. It analyses the impact of factors such as influencer marketing, online advertisements, peer opinions, product reviews, and promotional content. The findings reveal that social media plays a crucial role in shaping teenagers' buying behaviour, especially in categories such as clothing, beauty products, electronic gadgets, and lifestyle accessories. Visual appeal, trending content, and attractive offers were identified as major factors influencing their purchase decisions. The study concludes that social media has become a powerful medium that directly and indirectly affects teenagers' shopping patterns. It highlights the importance of responsible digital marketing practices and the need for awareness among teenagers to make informed and thoughtful purchasing decisions.

Keywords: Social Media; Teenagers; Shopping Preferences; Consumer Behaviour; Influencer Marketing;

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ICSRR – E090

TECH SHIELD TO EMPHASIZE SAFETY AND TECHNOLOGY

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Abstract:

The Smart Helmet is designed to improve road safety by preventing accidents caused by drunk driving and driver drowsiness. The system uses an MQ-3 alcohol sensor to detect alcohol consumption and prevent the vehicle from starting if alcohol is detected. An IR sensor is used to ensure that the rider is wearing the helmet and to detect drowsiness. In case of an accident, a GPS module sends the rider's location to emergency contacts for quick assistance. This system helps enhance rider safety and reduce road accidents.

Keywords: Smart Helmet, MQ-3 Sensor, IR Sensor, Drowsiness Detection, GPS, Accident Detection, Rider Safety.

ISBN 978-819992069-9

ICSRR – E091

ARTIFICIAL INTELLIGENCE IN SMART AGRICULTURE: ENHANCING FARMER LIVELIHOOD, SAFETY AND SUSTAINABLE FARMING PRACTICES

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Abstract:

Agriculture plays a fundamental role in supporting global food supply and rural livelihoods. However, conventional farming practices often involve high labour intensity, inefficient resource utilization and vulnerability to environmental uncertainties. The emergence of Artificial Intelligence (AI), Internet of Things (IoT) and smart sensing technologies has opened new opportunities for modernizing agricultural systems and improving the quality of life of farmers. This review explores the role of AI-driven agricultural technologies in enhancing farmers' lifestyle through improved productivity, safety and efficient farm management. Various AI applications such as precision agriculture, intelligent irrigation systems, crop disease detection, autonomous agricultural machinery and digital advisory services are examined. These technologies enable data-driven decision making, reduce physical workload, and optimize the use of agricultural inputs. In addition, AI-based safety monitoring and risk management systems help farmers respond effectively to environmental hazards and operational risks. Despite the promising advantages, challenges such as limited digital infrastructure, high implementation costs and lack of technical awareness among farmers continue to hinder widespread adoption. The review concludes that AI-enabled smart farming systems have significant potential to transform agricultural practices, enhance rural livelihoods, and promote sustainable agricultural development.

Keywords: Artificial Intelligence, Smart Farming, Precision Agriculture, Farm Safety Systems, IoT in Agriculture, Sustainable Agriculture.

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ICSRR – M092

SHIFTING GEARS: ECONOMIC IMPLICATIONS OF ELECTRIC VEHICLES IN THE FUTURE ENERGY LANDSCAPE

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Abstract:

The rapid adoption of electric vehicles (EVs) is reshaping the global energy and economic landscape. This study examines recent trends (2023-2025) using statistical tools and market data to assess the economic implications of EV diffusion. Results show that global EV sales rose from 14 million in 2023 to 17 million in 2024, with projections of 20 million in 2025, representing nearly 25 percent of new car sales. Regression analysis reveals a strong negative correlation (-0.97) between battery pack prices and EV sales, with each $10/kWh reduction in costs linked to 1.7 million additional EV sales. EVs displaced an estimated 1.3 million barrels per day of oil demand in 2024, demonstrating growing influence on global fuel markets. In India, over 2 million EVs were sold in 2024, with two and three wheelers dominating the market. Charging infrastructure expansion (>1.3 million public chargers added in 2024) and smart charging strategies are identified as critical to managing future electricity demand. The findings underscore that EVs are not only transport innovations but also macroeconomic drivers affecting energy security, trade, fiscal revenues and industrial competitiveness. Key recommendations include accelerating battery innovation and local manufacturing, integrating smart charging into electricity systems, redesigning fiscal instruments to replace declining fuel tax revenues, rapid electrification of two and three – wheelers, e-bus procurement and corridor charging expansion are identified as high-impact pathways. Overall, the study highlights EVs as a cornerstone of future energy planning, requiring coordinated industrial, fiscal and energy policy responses.

Keywords: Electric Vehicles (EVs), Energy Transition, Battery Costs, Oil Demand Displacement, Smart Charging.

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ICSRR – S093

KARUKKU AND THE VOICE OF DALIT FEMINISM IN INDIAN ENGLISH

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Abstract:

Karukku, authored by Bama Faustina Soosairaj and later translated into English, is widely regarded as a landmark text in Dalit and feminist writing. The work foregrounds the lived realities of Dalit women and exposes the intersection of caste, gender, and religion in Indian society. Often studied alongside the novels of Manju Kapur, Bama's autobiographical narrative challenges dominant literary traditions by articulating voices historically marginalized in mainstream Indian English literature. While Kapur's fiction explores the dilemmas faced by middle-class women negotiating patriarchal structures, Bama's narrative presents the struggles of Dalit women confronting systemic caste discrimination and institutional hypocrisy. This article examines the narrative style, thematic concerns, and socio-political significance of *Karukku*, situating it within the broader context of Dalit literature and postcolonial feminist discourse. Through a comparative perspective with Kapur's novels such as *Difficult Daughters* and *Home*, the study highlights how these texts expand the scope of feminist discourse in India and contribute to contemporary debates on identity, power, and resistance.

Keywords: Karukku, Dalit feminism, Bama Faustina, Manju Kapur, caste oppression, Indian English literature, autobiography, postcolonial feminism.

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ICSRR – M094

SUSTAINABLE SUPPLY CHAIN MANAGEMENT: CHALLENGES AND OPPORTUNITIES IN GLOBAL COMMERCE

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Abstract:

Sustainable Supply Chain Management (SSCM) has emerged as a critical strategy for organizations seeking to balance economic performance with environmental protection and social responsibility. Recent global assessments indicate that supply chain activities contribute to nearly 80% of global greenhouse gas emissions and over 90% of biodiversity loss associated with consumer goods production. At the same time, companies adopting sustainable supply chain practices report 10–20% cost savings, 15–30% reduction in carbon emissions, and improved resilience against disruptions. This book chapter examines the principles, challenges, and opportunities of SSCM in global commerce. It explores environmental, social, and economic dimensions; outlines methodological approaches for implementation; and discusses emerging technologies and policy frameworks. The chapter aims to provide researchers, practitioners, and policymakers with a comprehensive understanding of SSCM and its role in achieving long-term sustainable development.

Keywords: Sustainable supply chains, Green logistics, Circular economy, Ethical sourcing, Global commerce resilience.

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ICSRR – M095

DETERMINANTS OF PERCEIVED SERVICE QUALITY IN ONLINE MARKETPLACES: A CONSUMER-CENTRIC STUDY

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Abstract:

Online marketplaces have transformed retail by shifting consumers' evaluations from product-centered attributes to holistic assessments of platform service quality. This consumer-centric study examines the determinants of perceived service quality in online marketplaces and how those determinants shape trust, satisfaction, and repurchase intentions. Drawing on established service-quality frameworks (SERVQUAL, e-SERVQUAL) and recent empirical work, the study identifies five core dimensions as central to consumers' perceptions: website/app usability, information quality, fulfilment/reliability (logistics & delivery), security/privacy, and customer support/responsiveness. Additional moderating influences such as perceived value, reviews/ratings, and personalization are also considered. Using a mixed-methods approach (survey of online shoppers combined with exploratory interviews), the study tests a conceptual model that links service-quality dimensions to perceived trust and satisfaction, and in turn to behavioural intentions. Findings indicate that fulfilment/reliability and security/privacy exert the strongest direct influence on perceived service quality, while usability and information quality contribute indirectly by shaping trust. Reviews and seller reputation strengthen the effects of information quality on perceived value. Practical implications suggest marketplaces should prioritise logistics performance and transparent security assurances, while investing in clearer product information and responsive customer service. The research contributes to theory by adapting e-SERVQUAL to marketplace ecosystems and offering a consumer-centric measurement battery suitable for platform evaluation and continuous improvement. Limitations and directions for longitudinal and cross-country validation are discussed.

Keywords: Perceived Service Quality, Online Marketplace, Consumer-Centric Approach, E-Service Quality.

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ICSRR – M096

INFLUENCE OF SOCIAL MEDIA ON WOMEN BUYING BEHAVIOUR TOWARDS THE COSMETIC PRODUCTS WITH REFERENCE TO CHENNAI CITY

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Abstract:

The rapid growth of social media platforms has significantly changed consumer purchasing patterns, especially in the beauty and cosmetic industry. This study examines how social media influences women's buying behaviour towards cosmetic products in Chennai city. Today, women are highly exposed to advertisements, influencers, reviews, and peer opinions through platforms like Instagram, YouTube and Facebook. These platforms not only create awareness but also shape brand perception and trust. The study analyses how online engagement, influencer credibility, product reviews and promotional content affect purchase decisions. A structured questionnaire method was used to collect responses from women consumers in Chennai. The findings indicate that social media plays a major role in product discovery, brand preference and impulse buying behaviour. The study concludes that social media marketing has become more powerful than traditional marketing in influencing cosmetic purchase decisions among women.

Keywords : Social Media, Buying Behaviour, Cosmetic Products, Influencers, Online Reviews, Brand Trust, Impulse Buying, Chennai City.

ISBN 978-819992069-9

ICSRR – M097

AI-DRIVEN AUTONOMOUS ROBOTIC INSPECTION AND PREDICTIVE MAINTENANCE FRAMEWORK FOR ENHANCING PASSENGER EXPERIENCE AND COMMERCIAL SUSTAINABILITY IN INDIAN RAILWAYS

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Abstract:

This AI-driven framework introduces an autonomous robotic system for real-time inspection and predictive maintenance in Indian Railways, aiming to boost passenger experience and commercial viability. The system deploys AI-powered robots equipped with computer vision, sensors, and machine learning algorithms to scan tracks, carriages, and infrastructure for defects like cracks, wear, or electrical faults. Predictive analytics forecast failures using historical data and IoT inputs, enabling proactive repairs that minimize downtime. Reduces delays and enhances safety through timely interventions, leading to smoother journeys and higher satisfaction. Commercial Sustainability Lowers maintenance costs by 20-30% via optimized scheduling, extends asset life, and supports revenue growth from reliable services. Robotics operate autonomously via edge computing for low-latency decisions, with a digital twin for simulations. Pilot results show 95% accuracy in defect detection, paving the way for sustainable rail operations in a high-density context.

Keywords: Artificial Intelligence, Predictive Maintenance, Commercial Sustainability.

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ICSRR – E098

SMART DIABETIC RETINOPATHY DETECTION USING DEEP LEARNING WITH IMAGE QUALITY CHECK AND PROGRESS TRACKING

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Abstract:

Diabetic Retinopathy (DR) is a major cause of vision loss in people with diabetes, and early detection is key to preventing serious damage. This project introduces an advanced deep learning system that automatically detects diabetic retinopathy from retinal fundus images. A convolutional neural network based on the DenseNet169 architecture is employed to classify retinal images into five clinically significant stages: No Diabetic Retinopathy, Mild, Moderate, Severe, and Proliferative Diabetic Retinopathy. To enhance transparency and clinical interpretability, Explainable Artificial Intelligence (XAI) techniques such as Gradient-weighted Class Activation Mapping (Grad-CAM) are incorporated to visualize the retinal regions that contribute most to the model's predictions. Due to the computational and memory constraints of embedded platforms, image preprocessing, model inference, and explainability analysis are performed on a host computing system. The classification output is then transmitted directly to an ESP32 microcontroller through a UART serial interface, enabling low-latency and reliable communication. The ESP32 functions as an embedded visualization and control unit, where the received diagnostic result is processed and displayed on an LCD module interfaced via I2C or SPI communication. Alert messages are generated for severe disease stages to assist in timely clinical decision-making. In addition to classification and visualization, the system incorporates progress tracking to monitor disease advancement over time and a nearby hospital referral mechanism. When severe or proliferative DR stages are detected, the system automatically identifies and displays nearby eye care hospitals or ophthalmology centers based on the patient's location, enabling prompt medical consultation. Alert messages are generated to assist in timely clinical decision-making. The proposed system effectively integrates deep learning–based medical image analysis, explainable AI, embedded hardware, progress monitoring, and hospital referral support, offering a low-cost, portable, and scalable solution for real-time diabetic retinopathy screening in point-of-care and remote healthcare applications.

Keywords: Diabetic Retinopathy, Deep Learning, DenseNet169, Retinal Image Analysis, Medical Image Classification.

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ICSRR – M099

STUDY ON CUSTOMER PERCEPTION TOWARDS USE OF BATA SHOES AMONG COLLEGE STUDENTS IN CHENNAI CITY

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Abstract:

This study examines the customer perception towards the use of Bata shoes among college students in Chennai city. The primary objective is to analyse the level of brand awareness and identify the factors influencing purchase decisions and brand loyalty. A descriptive research design was adopted, and data was collected from 200 respondents using a structured questionnaire through convenience sampling. Both primary and secondary data sources were used to support the analysis. The findings reveal that Bata enjoys a high level of awareness and familiarity among students, with the majority associating the brand with quality, style, and strong brand value. Factors such as product quality, brand image, and design significantly influence purchasing decisions, while pricing plays a comparatively lesser role. Digital marketing, celebrity endorsements, and peer influence also strongly shape consumer perception. Although most respondents expressed satisfaction and strong purchase intention, some concerns were noted regarding durability, comfort, and pricing. Overall, the study highlights Bata's strong emotional and aspirational appeal among college students, making it a dominant brand in the sportswear market.

Keywords: Digital marketing, Bata, Satisfaction, Descriptive and Brand.

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ICSRR – E100

PHYTOCHEMICAL PROFILING AND THERAPEUTIC POTENTIAL OF BIOACTIVE COMPOUNDS FROM ALLIUM SATIVUM

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Abstract:

Garlic (*Allium sativum*) is a widely used medicinal plant known for its diverse therapeutic properties and long history in traditional medicine. Its biological activities are mainly attributed to bioactive phytochemicals, particularly organosulfur compounds such as Allicin, Ajoene, and Diallyl disulfide. These compounds exhibit antimicrobial, antioxidant, anti-inflammatory, anticancer, and cardioprotective effects. Phytochemical profiling plays a crucial role in identifying these active constituents using techniques such as solvent extraction, High-Performance Liquid Chromatography (HPLC), and Gas Chromatography–Mass Spectrometry (GC-MS). Recent studies highlight the potential of garlic-derived compounds in managing chronic diseases, including cardiovascular disorders, infections, and cancer. Their incorporation into pharmaceuticals, nutraceuticals, and functional foods further emphasizes their importance. This review focuses on garlic's phytochemical composition, analytical techniques, and therapeutic applications, supporting its role as a valuable source for developing natural medicines in modern healthcare.

Keywords: Allium sativum; Allicin; Phytochemical Profiling; Organosulfur Compounds; Therapeutic Potential.

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ICSRR – S101

A FUZZY RULE-BASED APPROACH FOR INVENTORY CONTROL UNDER UNCERTAIN DEMAND

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Abstract:

Inventory management requires effective decision-making to balance product availability and operational costs. In many real-world situations, inventory decisions are often made based on human judgment rather than precise numerical data. To capture this reasoning process, this chapter proposes a fuzzy rule-based inventory control system that models human decision logic using linguistic variables and IF–THEN rules. Demand level and inventory level are considered as input variables, while order quantity is treated as the output variable. A Mamdani fuzzy inference mechanism is used to process the rule base and determine appropriate ordering decisions. A numerical example is provided to illustrate the applicability of the proposed approach in handling uncertainty in practical inventory environments.

Keywords: Fuzzy logic; Inventory control; Human decision-making; Rule-based system; Mamdani inference; Supply chain management.

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ICSRR – S102

A NEUTROSOPHIC APPROACH TO INVENTORY MODELING UNDER UNCERTAIN DEMAND

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Abstract:

Inventory management plays an important role in ensuring the efficient flow of goods while maintaining a balance between supply and demand. Most classical inventory models assume that parameters such as demand, ordering cost, and holding cost are known precisely. In real-world situations, however, these parameters are often subject to uncertainty and incomplete information due to fluctuating market conditions and estimation errors. As a result, deterministic models may not always capture the complexity of practical inventory systems. To address this limitation, the present chapter explores an inventory modelling approach based on neutrosophic theory. Neutrosophic representation allows uncertainty to be expressed through three independent components: truth, indeterminacy, and falsity. This framework provides greater flexibility for modelling situations where information is not completely certain or may contain indeterminate elements. In the proposed model, demand is represented in a neutrosophic form while the cost structure follows the conventional inventory framework consisting of ordering and holding costs. A neutrosophic total cost function is formulated and analysed to determine the inventory policy that minimizes the overall cost of the system. The mathematical formulation is supported with a numerical example to demonstrate the practical applicability of the model. A comparison with the classical deterministic inventory model is also presented to highlight the effect of incorporating neutrosophic parameters. The analysis shows that the neutrosophic approach provides a broader representation of uncertainty while retaining the interpretability of traditional inventory models. The study illustrates how neutrosophic theory can be effectively applied to inventory decision-making problems involving indeterminate information.

Keywords: Neutrosophic set; Inventory management; Inventory model; Uncertainty modeling; Total inventory cost; Optimization.

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ICSRR – S103

ENTROPY-BASED MULTI-CRITERIA DECISION-MAKING APPROACH USING NEUTROSOPHIC SOFT SET MATRICES FOR POULTRY PRODUCTION EVALUATION

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Abstract:

Decision-making under uncertainty is a challenging task, especially in complex environments such as agricultural production systems where multiple factors and human judgments influence outcomes. This paper introduces an entropy-based multi-criteria decision-making (MCDM) framework using neutrosophic soft set matrices to evaluate poultry farm performance across different markets. The proposed method integrates two neutrosophic soft set matrices representing expert assessments from distinct marketplaces and applies neutrosophic arithmetic operators to obtain a crisp decision matrix. The entropy method is employed to determine the weights of decision parameters objectively, followed by computation of score values for ranking alternatives. A comprehensive numerical example is presented, involving eight poultry farms and eight criteria representing different domestic fowls. The results demonstrate that the third alternative yields the highest score, indicating superior production performance. This model effectively captures uncertainty, indeterminacy, and inconsistency inherent in real-world decision-making, providing a robust and flexible framework for agricultural and industrial evaluations.

Keywords: Entropy method, Multi-criteria decision-making (MCDM), Neutrosophic soft set matrices, Poultry production evaluation, Decision support systems.

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ICSRR – S104

BIVARIATE NEUTROSOPHIC FUZZY SOLID TRANSPORTATION PROBLEM

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Abstract:

Many real-world situations have an element of uncertainty, which is often addressed using fuzzy techniques. This study describes various transportation issues like transportation cost, transportation time, and conveyance capacity. The bivariate neutrosophic fuzzy solid transportation problem is an extension of the neutrosophic solid transportation problem. The bivariate neutrosophic solid fuzzy solid transportation problem consists of three constraints and two objective functions. Two objective functions Cost and time are combined by a single term (order pair), "bivariate neutrosophic fuzzy number," and conveyance capacity, supply and demand are crisp numbers. A bivariate neutrosophic fuzzy number consists of two parts (cost, time) and neutrosophic membership. Optimum allocation is made using the average of neutrosophic confidence, and optimum cost is calculated using the weighted cost-time score function, and it is solved using the row column reduction method, and it is compared with the standard method.

Keywords: Neutrosophic set, Bivariate neutrosophic set, Bivariate neutrosophic solid transportation problem.

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ICSRR – S105

AN ANALYSIS BETWEEN MULTI-CRITERIA DECISION-MAKING METHODS THROUGH AN APPLICATION UNDER PYTHAGOREAN FUZZY HYPERSOFT SETS

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Abstract:

Decision-making in complex environments frequently involves uncertainty, vagueness, and incomplete information. Traditional multi-criteria decision-making (MCDM) techniques often struggle to represent such uncertainty effectively. Pythagorean Fuzzy Hypersoft Sets (PFHSS) provide a powerful mathematical framework that integrates the advantages of Pythagorean fuzzy sets and hypersoft sets to handle multi-attribute decision problems involving sub-attributes. This chapter presents a comparative analysis of several well-known MCDM methods—PROMETHEE I, PROMETHEE II, ELECTRE, TOPSIS, EDAS, and WASPAS—within the PFHSS environment. A real-world inspired numerical example involving mobile phone selection based on compatibility with a telecommunication network is used to demonstrate the application of the proposed framework. The results obtained from the various methods are compared and analyzed using correlation coefficients to evaluate consistency among ranking results. The study demonstrates that PFHSS provides a flexible and effective structure for modeling complex decision problems with hierarchical parameters. The comparative analysis also highlights the robustness of the proposed framework across multiple decision-making methodologies.

Keywords: Pythagorean fuzzy hypersoft set (PFHSS), Hypersoft set (HSS), Electre, Topsis, Promethee I, Promethee II, EDAS, WASPAS.

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ICSRR – S106

PRODUCT ROOT SUM MEAN LABELING ON SUBDIVISION GRAPHS

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Abstract:

Let G=(V, E) be a simple graph with p vertices and q edges an injective function f:V→{1,2,3,…,q+1} is said to be a Product Root Sum Mean Labeling if the induced function f* defined on edges by $f^*(uv) = \frac{f(u)f(v)+\sqrt{f(u)+f(v)}}{2}$ yields different values. In this paper we prove the Product Root Sum Mean Labeling on Subdivision Graphs such as Subdivision graph of Triangular Snake graph, Quadrilateral Snake graph, Triangular Ladder graph, Total Comb graph and Middle Comb graph.

Keywords: Subdivision Graphs, Triangular Snake graph, Quadrilateral Snake graph, Triangular Ladder graph, Total Comb graph, Middle Comb graph, Product Root Sum Mean Labeling.

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ICSRR – S107

THE DIGITAL LOOKOUT: ENHANCING ROADSIDE SAFETY THROUGH EXPLAINABLE DEEP LEARNING

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Abstract:

Each year, about 3% of the world's GDP, and 1.3 million people, die in traffic accidents. This report analyzes the role of explainable deep learning as digital lookouts for roadside safety and roadside risk intelligent hazard detection and explainable decision making. We study the combination of cutting-edge technologies and frameworks including explainable AI methods SHAP and Grad-CAM with YOLOv8, ResNet-50, and Faster R-CNN. We show YOLOv8 as the best for our metrics with 96.2% detection accuracy for 95 FPS. Also, SHAP values reach 92.5% on interpretability. Explainable AI systems create 100ms on-the-fly detection of and collisions and explainable AI systems show 35-60% real time detections reduction of 100ms on-the-fly or explainable decision making. We create the first transparent explainability integrated deep learning solution to safe systems to real world explainable AI products systems for the first time.

Keywords: Explainable AI, Deep learning, Roadside safety, Object detection, Grad-CAM, Autonomous vehicles.

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ICSRR – S108

A STUDY ON DOMINATION PARAMETERS OF GRAPHS

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Abstract:

Domination in graphs is an important concept in Graph Theory and network analysis. It focuses on identifying a subset of vertices that can effectively control or monitor the entire graph. Domination parameters such as domination number, total domination number, connected domination number, and independent domination number play a crucial role in analysing the structural properties of graph networks. These parameters have numerous applications in wireless sensor networks, communication systems, facility location problems, and social network analysis. This Chapter presents an overview of domination parameters in graph networks, discusses their mathematical definitions, and explains their significance in network optimization. The study also explores different domination models and their theoretical implications in modern graph-based systems. Understanding these domination parameters helps in designing efficient algorithms for monitoring, controlling, and optimizing large-scale networks.

Keywords: Graphs, Dominating Set, Total Domination, Connected Domination, Independent Domination.

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ICSRR – S109

A STUDY ON CRYPTOGRAPHIC ALGORITHMS

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Abstract:

Security is a major problem that we faced today, while we stored or send sensitive informations. Cryptography is an effective tool that secure the information by converting a known data into an unknown format, only the receiver can read the data. There are many cryptographic algorithms that allows secured and accurate transferring of data. In this paper we mainly discuss about two types of Algorithms; Symmetric algorithm and Asymmetric algorithm and Hash functions. Also focus on existing Cryptographic algorithms like AES, DES, RSA, ECC, SHA 256, MD5.

Keywords: Cryptography, Encryption, Decryption, Symmetric key Cryptography, Asymmetric key Cryptography and Hash function.

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ICSRR – S110

A STUDY ON ADVANTAGES OF QUEUING MODELS

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Abstract:

Queuing theory is an important branch of operations research that studies waiting lines and service systems. It is used to analyse situations where customers or items arrive for service and must wait if the service facility is busy. Queuing models help organizations reduce waiting time, improve service efficiency, and optimize the use of resources. These models are widely applied in many real-life systems such as banks, hospitals, call centers, transportation networks, supermarkets, and computer networks. This paper discusses the advantages of queuing models and explains how they are applied in real-life situations with examples.

Keywords: Queuing Models, Single Server, Multiple Server, Queue Discipline.

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ICSRR – S111

THE PASSION COMPASS: USING MACHINE LEARNING TO ALIGN ACADEMIC TALENT WITH CAREER SUCCESS

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Abstract:

This chapter focuses on the use of machine learning (ML) techniques as a form of 'passion compass' that can help students identify suitable career pathways concerning one's academic strengths, internal drives, and work-related goals. We devise a model, which predicts future career potential, based on the integration of academic achievements, personality, the alignment of one's passions, and the level of one's competencies. The Random Forest method, in this case, gives a prediction accuracy over 93%, and the passion alignment, in the feature importance analysis, falls second to the academic performance (24.5%) with 18.7%. The evidence of the impact of one's passion on career satisfaction has been well documented and is robust ($\beta = 0.713$, $R^2 = 0.547$). We conclude this chapter with the outline of an innovative, integrated, and holistic career guidance system based on machine learning that maximises student's wellbeing and enhances the effectiveness of the labour market.

Keywords: Machine learning, Career guidance, data mining, Academic talent, Career success prediction

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ICSRR – S112

DIALECT WORDS OF VELLORE DISTRICT

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Abstract:

Language reflects the geographical setting, social life, and cultural practices of the community that uses it. Regional dialects emerge as variations of a language shaped by local environments, occupations, traditions, and interactions among people. The present study examines the dialect words used by the people of Vellore District and analyses how these words function in everyday communication. The research categorizes dialect expressions into three major groups: occupation-related, nature-related, and culture-related vocabulary. Through selected examples collected from local speech usage, the study highlights how dialect words represent the lifestyle, ecological surroundings, and cultural identity of the region. The findings reveal that dialect expressions not only serve as linguistic tools for communication but also preserve the cultural heritage and social memory of the community. By documenting and analysing these regional expressions, the study contributes to the understanding of dialectal diversity in Tamil and emphasizes the importance of preserving local linguistic traditions in contemporary society.

Keywords: Dialect words, Regional language variation, Tamil dialectology, Cultural vocabulary, Nature-related vocabulary.

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ICSRR – S113

SCIENTIFIC MESSAGES IN THE NOVELS OF NANJIL NADAN

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Abstract:

Tamil literature has always reflected the knowledge systems embedded in everyday life. The works of Nanjil Nadan, one of the significant contemporary Tamil writers, provide rich insights into the scientific knowledge present in rural culture and traditional lifestyles. His novels portray a variety of scientific elements related to agriculture, ecology, engineering, food science, microbiology, economics, and mathematics. Through realistic narratives rooted in the socio-cultural life of Kanyakumari district, the author documents indigenous knowledge systems that have evolved through generations. This chapter analyses the scientific messages embedded in Nanjil Nadan's novels and highlights how traditional practices reflect principles of modern science. The study demonstrates that science is not confined to laboratories but is deeply integrated into the daily life of farmers, homemakers, and traders. By documenting such experiential knowledge, Nanjil Nadan contributes significantly to the intellectual richness of Tamil literature and promotes a sustainable way of life closely connected with nature.

Keywords: Nanjil Nadan, Scientific Knowledge in Literature, Indigenous Knowledge Systems, Tamil Novels, Food Science, Ecology.

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ICSRR – S114

SCIENTIFIC THOUGHTS IN THIRUMANDIRAM

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Abstract:

Siddha literature holds a distinctive place in the history of Tamil literature. The Siddhars proposed a holistic way of life that integrates the physical, mental, and spiritual dimensions of human existence. Their ideas are not limited to spiritual philosophy alone; they also contain scientific insights related to human anatomy, breathing mechanisms, nutrition, pharmacology, herbal medicine, and other fields. The text Thirumanthiram includes various scientific perspectives such as embryology, dietary principles, herbal medicine, yogic science, and psychology. This study examines and explains the scientific concepts found in Thirumanthiram with appropriate literary evidence and analysis.

Keywords: Thirumanthiram, Siddha Literature, Scientific Thought, Yogic Science, Siddha Medicine.

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ICSRR – S115

WORKSHIP PRACTICES OF THE ANCIENT TAMIZHAR IN SANGAM LITERATURE

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Abstract:

Sangam Literature represents one of the earliest and most significant literary traditions of the Tamil language. These works provide valuable insights into the lifestyle, social organization, religious beliefs, and ritual practices of the ancient Tamil people. The early Tamizhar lived in close harmony with nature and considered natural elements such as mountains, trees, seas, and rivers as sacred manifestations worthy of worship. In addition, they followed the custom of commemorating fallen heroes by erecting hero stones (Nadukal) and performing ritual worship in their honour. Through the study of Sangam texts, it is possible to understand the diverse forms of worship practiced by the ancient Tamizhar, including devotion to natural forces, village deities, and major gods. This study examines the various worship traditions reflected in Sangam literature with relevant literary evidence and attempts to highlight the spiritual outlook and religious consciousness of the early Tamil society.

Keywords: Sangam Literature, Religion, Workship, Ancient Tamizhar.

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ICSRR – E116

TRUST-ADAPTIVE BLOCKCHAIN ORCHESTRATION FOR SCALABLE AND SECURE INTERNET OF THINGS ARCHITECTURES

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Abstract:

More security, immutability, and decentralised trust The combination of Blockchain and the Internet of Things (IoT) is likely to bring better security, immutability, and decentralised trust. Nevertheless, direct interconnection of IoT devices with blockchain networks limits critical scalability, latency and energy challenges, especially in very large scale applications like smart cities, industrial IoT and healthcare monitoring systems. The paper presents a Trust-Adaptive Blockchain Orchestration (TAB-IoT) which is a framework that dynamically controls blockchain invocations, depending on real time analysis of device trust. In contrast to traditional static architectures, where all the transactions are similarly captured on-chain, TAB-IoT proposes a multi-level trust-scoring system, which evaluates the behaviour of nodes, integrity of its data, deviation of anomalies and consistency in communication. Depending on the calculated trust levels, transactions may be automatically sent to off-chain storage, side-chain verification, or entire on-chain enforcement of smart contracts. Such an adaptive coordination minimizes the unwarranted blockchain overheads and maintains high-risk interactions security assurances. In addition, a micro-consensus mechanism that is based on edges is lightweight and minimises the general cost of consensus and maximized throughput. The improved transaction efficiency, lowering latency, and increased malicious node resilience of experimental evaluation are better than the conventional blockchain-IoT integrations. The given framework provides a scalable and trust-aware base on the next-generation secure IoT ecosystems.

Keywords: Trust-Adaptive Orchestration, Blockchain-Enabled Internet of Things, Scalable IoT Security, Dynamic Trust Scoring, Edge-Assisted Consensus

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ICSRR – S117

BIOTECHNOLOGICAL POTENTIAL OF MICROBIAL PIGMENTS: FROM PRODUCTION TO APPLICATION

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Abstract:

Microbial pigments have gained considerable attention as sustainable and eco-friendly alternatives to synthetic colorants, driven by increasing environmental concerns and demand for natural products. These pigments are produced by bacteria, fungi, yeasts, and microalgae and display a wide range of colors along with bioactive properties such as antioxidant, antimicrobial, anticancer, and anti-inflammatory activities. Advances in biotechnology, including metabolic engineering, synthetic biology, and process optimization, have significantly improved pigment yield, stability, and scalability. The use of low-cost substrates and agro-industrial wastes further enhances economic feasibility and sustainability. Efficient downstream processing techniques ensure pigment purity, safety, and functional performance for diverse applications. Microbial pigments are increasingly utilized in food, pharmaceuticals, cosmetics, textiles, and agriculture due to their multifunctional nature. Despite these advantages, challenges such as large-scale production, stability, and regulatory approvals remain. This chapter presents a comprehensive overview of microbial pigment sources, classification, biosynthesis, production technologies, downstream processing, applications, and future prospects, highlighting their importance in sustainable industrial biotechnology.

Keywords: *Microbial pigments; Biopigments; Fermentation; Biosynthesis; Carotenoids; Industrial applications; Natural colorants; Metabolic engineering; Sustainable biotechnology*

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ICSRR – S118

NUMERICAL INVESTIGATION OF DUFOUR AND ROTATIONAL EFFECTS ON UNSTEADY MHD PARABOLIC FLOW OVER A VERTICALLY ACCELERATING PLATE

A.Selvaraj[a*], R.Raju[b] and C.V.Girinath[c]

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Abstract:

This study examines the influence of the Dufour effect on unsteady magnetohydrodynamic (MHD) parabolic flow past a vertically accelerating rotating plate with variable temperature and uniform concentration. The investigation focuses on understanding the combined effects of thermal diffusion, mass diffusion, and rotation on the behaviour of an electrically conducting fluid. The governing partial differential equations describing the momentum, energy, and concentration fields are formulated using appropriate non-dimensional variables. These equations are solved using the inverse Laplace transform technique, which provides analytical solutions for the velocity, temperature, and concentration distributions.

Keywords: Magnetohydrodynamics (MHD); Dufour effect; Parabolic flow; vertical plate; Heat and mass transfer; Rotation; Schmidt

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ICSRR – S119

DUFOUR AND ROTATIONAL EFFECTS ON UNSTEADY FLOW PAST A PARABOLIC ACCELERATED VERTICAL PLATE

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Abstract:

This study examines the influences of rotation and the Dufour parameter on unstable free convective flow over a parabolically accelerated infinite vertical plate characterized by uniform temperature and constant mass diffusion. It is presumed that the fluid can carry electricity and cannot be compressed. The governing partial differential equations that describe momentum, energy, and concentration are written in a way that doesn't use any units. The Laplace transform method is used to find analytical solutions for the domains of velocity, temperature, and concentration. We look at how crucial physical factors like the temperature Grashof number, mass Grashof number, Dufour number, and rotation parameter affect the flow characteristics. The findings indicate that fluid velocity rises with higher thermal and mass Grashof numbers, attributed to augmented buoyancy effects. An increase in the Dufour parameter considerably improves the temperature and concentration distributions within the boundary layer. The research offers a valuable understanding of the synergistic impacts of thermal diffusion and rotational motion on unstable convective transport phenomena in electrically conducting fluids, pertinent to various engineering and geophysical contexts.

Keywords: Unsteady flow; Dufour effect; Rotational effect; Parabolic accelerated vertical plate; Heat and mass transfer.

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ICSRR – S120

A STUDY ON PEG SOLITAIRE AND ITS SOLVABILITY

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Abstract:

One of the most popular combinatorial puzzles under both graph theory and recreational mathematics is "Peg Solitaire." The main idea of the game is to eliminate the pegs on the board by making a safe jump on the board. The game is associated with some challenging mathematical problems with regard to the transition of the configuration of the game. In this chapter, the game "Peg Solitaire" is simulated by using the concept of graph theory, where the safe jumps are represented by paths of length two on the graph. The game can be extended to any graph structure, like paths, cycles, trees, and multipartite graphs. The chapter introduces the concept of solvability, covering the different forms of it, such as location solvability, strong solvability, and weak solvability, among others. Peg Solitaire, a game played on tripartite graphs, is discussed, highlighting the role of the structure of the graphs in the solvability of the game. Algorithmic approaches to the solution spaces, determining the solvability, are discussed, highlighting the role of combinatorial and graph theory approaches to the study of a simple puzzle, giving a glimpse into the study of more complex problems in discrete mathematics.

Keywords: Peg Solitaire; Graph Theory; Solvability; Combinatorial Games.

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ICSRR – S121

MATHEMATICAL MODEL OF UNSTEADY FLOW OF CEREBROSPINAL FLUID IN THE PERIVASCULAR REGION

S.Senthamilselvi[a*], S.Meenakshi Sundram[b], T.S.Suchita[c]

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Abstract:

Cerebrospinal fluid (CSF) transport through the perivascular space (PVS) plays an impotent role in the glymphatic system of the brain, supporting nutrient delivery and metabolic waste clearance. Here we describe the unsteady flow of CSF in the perivascular region. The governing equations are derived from the Navier–Stokes equations coupled with a solute transport equation. The model Darcy is the permeability parameter, and chemical reaction parameter. The governing equations are non-dimensionalized and solved using the Laplace transform technique. Analytical expressions for velocity and concentration fields are derived and discussed. The results demonstrate that wall motion significantly enhances the CSF transport while buoyancy and porous medium resistance affect the velocity distribution. The proposed model provides deeper insight into fluid dynamics in the glymphatic pathway and can contribute to improved understanding of neurological diseases associated with impaired CSF circulation.

Keywords: Perivascular Space, Cerebrospinal fluid, Permeability, Darcy number, Pressure, diffusivity.

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ICSRR – S122

MATHEMATICAL MODELLING OF BLOOD PLASMA FLOW THROUGH PULMONARY CAPILLARIES

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Abstract:

The transport of blood plasma through pulmonary capillaries plays a crucial role in the exchange of oxygen and carbon dioxide within the human respiratory system. Understanding the dynamics of plasma flow in the presence of external forces is important for studying physiological processes and biomedical applications. In the present study, a mathematical model is developed to investigate the unsteady laminar flow of blood plasma in the lung mechanism under the influence of an applied magnetic field. Blood plasma is treated as a viscous, incompressible and electrically conducting fluid flowing through a permeable medium representing the pulmonary tissue. The governing equations of continuity, momentum, energy and mass transfer are formulated using the principles of magnetohydrodynamics. These equations are converted into dimensionless form using suitable non-dimensional parameters such as the Grashof number, Hartmann number, Prandtl number and Schmidt number. An analytical solution is obtained using the perturbation method. The influence of various physical parameters on plasma velocity, temperature and oxygen concentration distributions is analyzed graphically. The results indicate that magnetic field strength, buoyancy effects and permeability of lung tissue significantly influence plasma transport in pulmonary circulation. The present model provides a theoretical framework for understanding blood plasma flow and gas transport in the human lung.

Keywords: Blood Plasma Flow Pulmonary Circulation, Mathematical Modelling, Oxygen Transport, Perturbation technique.

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ICSRR – S123

A STUDY ON FUZZY GRAPHS

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Abstract :

Fuzzy graph theory is an extension of classical graph theory designed to model systems that involve uncertainty, vagueness, and partial relationships. In many real-world problems, relationships between elements are not strictly binary; instead, they exist with varying degrees of strength. Fuzzy graph theory integrates the principles of fuzzy set theory with graph theory to represent such uncertain structures. In this paper, the fundamental concepts of fuzzy graphs are introduced, including fuzzy vertices, fuzzy edges, and membership functions. The methodology used to construct fuzzy graphs and analyze their properties is also discussed. Applications of fuzzy graphs in social networks, communication systems, decision making, and transportation modeling are highlighted. The study demonstrates that fuzzy graph models provide a flexible and effective framework for representing complex systems where classical graphs fail to capture uncertainty.

Keywords: Graph Theory; Fuzzy Graph Theory; Graph Models.

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ICSRR – S124

BIOTECHNOLOGICAL POTENTIAL OF MICROBIAL PIGMENTS: FROM PRODUCTION TO APPLICATION

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Abstract:

Microbial pigments have gained considerable attention as sustainable and eco-friendly alternatives to synthetic colorants, driven by increasing environmental concerns and demand for natural products. These pigments are produced by bacteria, fungi, yeasts, and microalgae and display a wide range of colors along with bioactive properties such as antioxidant, antimicrobial, anticancer, and anti-inflammatory activities. Advances in biotechnology, including metabolic engineering, synthetic biology, and process optimization, have significantly improved pigment yield, stability, and scalability. The use of low-cost substrates and agro-industrial wastes further enhances economic feasibility and sustainability. Efficient downstream processing techniques ensure pigment purity, safety, and functional performance for diverse applications. Microbial pigments are increasingly utilized in food, pharmaceuticals, cosmetics, textiles, and agriculture due to their multifunctional nature. Despite these advantages, challenges such as large-scale production, stability, and regulatory approvals remain. This chapter presents a comprehensive overview of microbial pigment sources, classification, biosynthesis, production technologies, downstream processing, applications, and future prospects, highlighting their importance in sustainable industrial biotechnology.

Keywords: *Microbial pigments; Biopigments; Fermentation; Biosynthesis; Carotenoids; Industrial applications; Natural colorants; Metabolic engineering; Sustainable biotechnology*

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ICSRR – E125

VENOM PEPTIDES TO THERAPEUTICS, MASTOPARANS: A SHORT REVIEW

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Abstract:

Mastoparans are a diverse class of host-defence peptides playing a pivotal role in protecting the host from predators. These cationic tetra-decapeptides resides mainly in the venom of wasps, hornets, and certain bee species, contributing to potent defensive and predatory arsenal. They are of attractive interest in biomedical research for their broad therapeutic potential. Their amphipathic nature and membrane-targeting properties enables them to serve as ideal candidates in the development of novel treatments for cancer. In cancer treatment they can induce apoptosis or necrosis in malignant cells. They also serve as therapeutics for metabolic disorders such as diabetes, influencing insulin secretion and glucose metabolism. In this review, we highlight the diverse biological functions of mastoparans, with a focus on their novel emerging role in the treatment of cancer and diabetes.

Keywords: Mastoparans; tetradeca-peptides; amphipathic; metabolic diseases; diabetes; Cancer.

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ICSRR – E126

COMPARISON AND DESIGN ANALYSIS OF FLAT SLAB AND CONVENTIONAL ONE -WAY AND TWO - WAY SLABS

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Abstract:

Reinforced concrete slabs are one of the most important structural elements in multi-storey buildings, as they directly transfer loads to beams and columns. The selection of an appropriate slab system significantly influences the structural performance, construction cost, and architectural flexibility of a building. This study presents a comparative analysis and design of three commonly used slab systems: flat slab, conventional one-way slab, and conventional two-way slab. A multi-storey reinforced concrete building model is considered, and three separate structural models are developed for each slab system. The analysis and design are carried out using structural analysis software, and the design provisions are based on IS 456:2000 for reinforced concrete structures along with loading guidelines from IS 875. Parameters such as bending moment, shear force, deflection, reinforcement requirement, and overall structural performance are obtained from the analysis .In the conventional slab system, beams are provided to support the slabs and transfer loads to the columns, whereas in the flat slab system the slab is directly supported by columns without beams, often with drop panels to improve shear capacity. The results obtained from the analysis are compared to understand the structural efficiency, economy, and feasibility of each slab type.

Keyboard: flat slab; conventional one-way slab; conventional two-way slab

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ICSRR – S127

A NOVEL ENCRYPTION FRAMEWORK USING SELF-INVERTIBLE MATRICES AND COMPLETE GRAPH ADJACENCY MATRIX STRUCTURES

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Abstract:

Encryption techniques form the foundation for securing communication and protecting information in the modern digital era. With the rapid growth of internet usage and network-based interactions, the need for robust encryption methods has become increasingly critical. Transmitting sensitive information over unsecured or vulnerable networks exposes it to risks such as cyberattacks, data breaches, and unauthorized access. To address these challenges, cryptographic techniques have been widely developed and applied. Classical methods such as the Caesar Cipher, Atbash Cipher, Hill Cipher, along with various symmetric encryption schemes, have significantly contributed to secure communication. In this paper, we propose an encryption approach that integrates a self-invertible matrix, the adjacency matrix, and the structure of a complete graph with a Hamiltonian circuit to generate complex ciphertext from given message units. A key feature of this method is the use of a self-invertible matrix as the encryption key, which inherently guarantees the existence of its inverse without requiring explicit computation. This property simplifies the decryption process and considerably reduces computational complexity while maintaining the strength of the encryption scheme.

Keywords: Adjacency Matrix, Complete graph, Graph Encryption, Hamiltonian circuit, Self-Invertible Matrix.

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ICSRR – E128

HUMAN ACTIVITY RECOGNITION USING MACHINE LEARNING

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Abstract:

Human Activity Recognition (HAR) using machine learning has emerged as a critical research domain due to its wide-ranging applications in healthcare, smart homes, surveillance, sports analytics, and human–computer interaction. With the proliferation of wearable sensors and Internet of Things (IoT) devices, large volumes of time-series data are generated, enabling accurate activity classification. Recent studies report recognition accuracies ranging from 90% to 98% for common activities such as walking, sitting, standing, and running using machine learning and deep learning models. This chapter presents a comprehensive overview of HAR systems, covering sensor technologies, data preprocessing, feature extraction, machine learning methodologies, and performance evaluation. Experimental findings from existing literature indicate that hybrid models combining signal processing and machine learning improve accuracy by 8–12% compared to traditional approaches. The chapter also discusses challenges, ethical considerations, and future research directions, aligning HAR advancements with global sustainability goals.

Keywords: Human Activity Recognition, Machine Learning, Wearable Sensors, Feature Extraction, Activity Classification.

ISBN 978-819992069-9

ICSRR 2026 – Presentation Schedule

Date	Time	Theme
21.03.2026	Session 1: 10.00 am to 11.00 am	All Bio-Engineering papers
21.03.2026	Session 2: 11.15 am to 12.15 pm	All Pharmacy papers
21.03.2026	Session 3: 1.45 pm to 2.45 pm	All Pharmacy papers
21.03.2026	Session 4: 3.00 pm to 4.00 pm	All CSE & Maths papers
22.03.2026	Session 5: 10.00 am to 11.00 am	All Mechanical papers
22.03.2026	Session 6: 11.15 am to 12.15 pm	All Management papers
22.03.2026	Session 7: 1.45 pm to 2.45 pm	All Civil papers
22.03.2026	Session 8: 3.00 pm to 4.00 pm	Eng & Tamil papers

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